

THE EASTERN REVIEW



Most Important American
Pronouncement on Far
Eastern Affairs

AMBASSADOR CASTLE'S SIGNIFICANT
SPEECH IN TOKYO

MANTELL ON THE NANKING-
SHANGHAI RAILWAY

BARON SHIDEHARA ON CHINA

THE AIR MAIL PROBLEM IN CHINA

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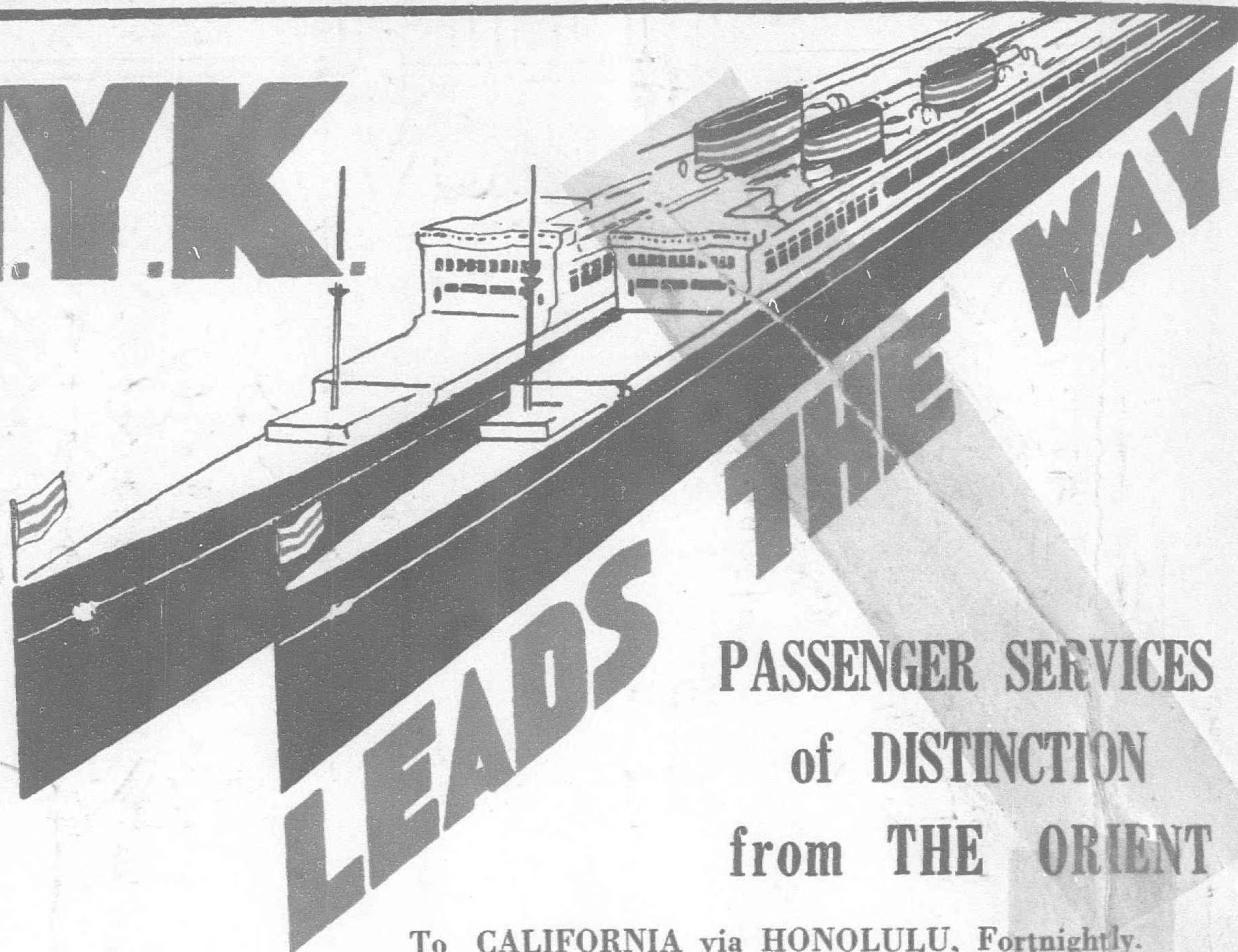
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The Far Eastern Review

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VOL. XXVI

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Most Important American Pronouncement on Far Eastern Affairs

Ambassador Castle's Speech in Japan Opens New Era:
Co-operation Between Japan and United States Guarantees Peace

Joint Attitude Towards China

NOT since the Washington Conference, when all Governments revised their Far Eastern policy and entered upon a so-called new era, has a statement of Government policy been as important, as indubitably articulated or as far-reaching in its consequences as the address delivered by Mr. William R. Castle, jr., American Ambassador to Japan at the America-Japan Society in Tokyo. The Japanese press gave full space to this address. According to the *Japan Times*, "probably it was for the first time in history that so much space was devoted by all the papers to an address delivered by a foreign envoy."

The address is doubly significant because Mr. Castle is no political appointee in American diplomacy, talking with stump-speaking fluency. Mr. Castle is an Assistant Secretary of State, who has long been the chief of a bureau in the State Department and who has played a very definite rôle in the formulation of American policy. He was sent to Japan for the tenure of the Naval Conference in London and any statement of American policy made at this time must have the unreserved imprimature of the American Government, because of the effect which it may have on the Naval Conference.

In a brilliant biographical article in the *New York Herald-Tribune*, Mr. Henry Cabot Lodge describes Mr. Castle's career:

He was born in Hawaii as a loyal subject of King Kalakaua in 1878, of New England parents whose ancestors came from England in 1645. His grandfather had gone to Hawaii in 1836 as financial secretary of the American Board of Missions, and had left because the board wanted to meddle in politics. Mr. Castle's father was in the famous office of Joseph H. Choate in New York when the King of Hawaii asked him to become Attorney General of the islands. He accepted and subsequently became Hawaiian Minister to Washington and finally an annexation commissioner in 1893.

Castle was not only born in Hawaii but was educated there. From Hawaii he went straight to Harvard, and any one who has entered a large university without having come from a big preparatory school knows what this means. "The first year at Harvard," we are told, "was not very pleasant." But Castle overcame this difficulty to such an extent that he is now more closely affiliated with Harvard than most Harvard graduates.

He was in the class of 1900, which has given so many men to the government service. "Ought, ought," as it is called, numbers Dwight Davis, former Secretary of War and now Governor General of the Philippines; Robert Bliss, now American Ambassador to the Argentine; William Phillips, the first American Minister to Canada; Peter Jay, who recently resigned his ambassadorship, and Charles Curtis, the American Consul General in Munich.

Castle's entrance into the service of the government was indirect. After his graduation he stayed at Harvard and taught English for three years. From 1906 to 1913 he was assistant dean, followed by two years of travel. Back in Cambridge, he became editor of *The Harvard Magazine* and gave courses in English. Then came the war.

In this brief record one finds many clues to some of the most striking sides of Castle's character. For seven years he was assistant-dean at Harvard. That is, his was the duty of keeping the unders graduates "up to scratch," not only in their work but in their behavior. Most deans find it a thankless and disagreeable task and undergraduates regard most deans as policemen without the uniform. But Castle was an exception. He likes his work and the undergraduates liked him. He probably enjoyed it as much as anything he ever did, because he has that very rare quality—an understanding of men, especially young ones.

The reader may not see how this would help him in deciphering the mazes of diplomacy, but it probably has been his greatest source of strength. In his division of western European affairs were many young men helping him in his work. Just as the general succeeds best who has won the love of his men so Castle succeeded because his subordinates knew that he liked them, understood them and would help them.

Apart from this relation between Mr. Castle and young men his understanding of human nature is of enormous and constant value to



H. E. William R. Castle, Jr.

him. Some of the men now carrying on our foreign relations may deserve the epithet so frequently heard—“The Dancing Boys of the State Department.” This variety of American diplomat enters the diplomatic service because he likes the easy path and regards the entertainments of foreign capitals as the summum bonum of life. This is the type which regards an assignment to Central America, where our Balkans are actually fermenting, as a “bad post” and is anxious to “go into the field,” say in Paris or London, where dining out and not suppressing revolutions will be his principal concern. But Castle entered the State Department as a special assistant and did not enter the foreign service.

When Congress is in session foreign relations come prominently into the foreground. At the State Department there are rustling and scurrying and officials asking themselves; “What is the Senate going to do?”

In such situations it is not enough to understand the particular treaty or protocol which is before the Senate. A knowledge of the whimsies of public opinion, of individual Senators and of that inclusive term “how the Senate will act” is indispensable if a measure is to succeed. Especially is that true in the United States, where Cabinet ministers are denied the privilege of the floor and where the contact between the executive and legislative branches is comparatively remote.

Mr. Castle realized the importance of this. At his house he entertained not only the foreign diplomats but many Senators and members of Congress. He understood them and liked them. They reciprocated.

When he was giving courses in English literature at Harvard Mr. Castle always insisted that a study of literature was worth nothing unless one knew the history of the time at which the literature was written. This was in conflict with a theory of education current to-day which says that all knowledge can be subdivided and that a man can study, say, biology without a knowledge of chemistry.

Again we find a parallel between his earlier and his later life, for the division of western European affairs evinced a similar theory that all knowledge was divisible into labeled pigeonholes. At that time the division occupied itself solely with “political” questions. What was “legal” had to be passed on and usually drafted by the solicitor’s office and what was “economic” had to be drafted or passed on by the office of the economic adviser. Inasmuch as there are few, if any, diplomatic questions which do not involve both economic and legal considerations, the messengers in the department were busy carrying dispatches around from the various divisions to the solicitor’s and the economist’s offices.

The matter should be treated as a whole, Mr. Castle thought, and now a representative from the economist’s office is detailed to each geographical division. May be a similar step will some day be taken with regard to the solicitor’s office.

As chief of the division of western European affairs he again applied his theory that knowledge was a connected whole and could not be laid on in pieces like shingles on a roof. Accordingly he made it a practice to make frequent trips to Europe and he urged his subordinates to do the same. On these trips he usually stayed at the American Embassy and made contacts with the leaders in each country.

But let us continue this interlarding of Castle’s past with his present. When the war broke out he tried to enter Plattsburg, but his health prevented him from doing so. He came to Washington and told the Red Cross that he would like to organize a bureau for the relief of prisoners and to search for missing men. Apparently the authorities of the Red Cross did not take his suggestion very seriously, for he started the work with an office force of only one stenographer. So necessary and successful was this work that at the end of the war Mr. Castle had 600 employees in Washington, 1,000 in American training camps and 1,500 abroad, and he was handling a mail of 10,000 letters a day.

When the war ended Mr. Frank Polk, then Under Secretary of State, asked Castle to enter the department as a special assistant. In his work with the Red Cross he had made innumerable contacts which could not be duplicated and he had always had a broad knowledge of Europe. Mr. Castle accepted, entered the department as a drafting officer, rose to assistant chief of western European affairs, then to chief and finally accepted his appointment as Assistant Secretary of State.

When he became Assistant Secretary of State in April, 1927, the foreign relations of the United States with western and eastern Europe and the Near East fell under his jurisdiction. As western Europe includes the British Empire, and as the British Empire in its turn has ramifications everywhere, it can be seen that the scope of his activities was very wide. In diplomacy, of all professions, “no news is good news,” and it is no small testimonial to Mr. Castle’s ability that during his term as Assistant Secretary the complicated business of the United States in these many parts of the world was so efficiently and quietly handled.

He initiated many reforms as Assistant Secretary, most of them of a kind too special to be appreciated by the layman. With regard to all of them he denies firmly that they were his brain-children or his accomplishments. Instead of trumpeting his deeds from the house-tops in the fashion all too common in Washington, he will say: “Oh, no, I didn’t put that through. I just preached it to many others.”

It is then a diplomat of such proportions and such relations with his Government who was elected by the American State Department to restate America’s policy in Asia. We are then justified in assuming that Mr. Castle’s address represents the fully considered opinion of the President of the United States and his Secretary of State. This re-orientation of American policy in Asia, with particular reference to China, the most active co-operation between Japan and the United States not only in politics, but in commerce and industry, a co-operation which has been advocated by the *Far Eastern Review* for a decade and for which Mr. George Bronson Rea, the publisher of this magazine was pilloried by those

whose only solution for the Far Eastern question is a war between the United States and Japan. “Trouble-making people,” Ambassador Castle dubs these miserable war-mongers. He says of them:

“But these certain Americans and certain Japanese are trouble-making people. It is our duty to see that they shall never instil suspicion into the minds of either Government, thus disturbing the serenity of our relations.”

Ambassador Castle’s words should be carefully noted by China. These propagandists, these trouble-making people, these war-mongers have also been misleading China, with the result that to-day the press of the entire world is unfriendly to China. China should cease to use them to make enemies for herself and enemies for her future. *Peace and friendship is the keynote of Pacific policy, not hatred and war!*

But more significant than Ambassador Castle’s indirect attack on those who have boasted of their ability to make war between Japan and the United States on account of China, is his restatement of American financial policy with regard to investments in both Japan and China:

Even more absurd, it seems to me, is the talk one sometimes hears of friction between Japan and America in the development of the great potential markets of China. There more than anywhere else should there be co-operation instead of rivalry. Just as we shall always work together to advance political stability in China so we must inevitably co-operate in the sale of our merchandise. Japan needs American raw material to manufacture what the Chinese want. America needs the good will of Japanese traders in China in the distribution of American-made goods. Both must gain if we work together as I believe we shall. I can see no possibility of friction in the growing trade of the two nations in all parts of the world but only of a fuller understanding and friendship. And this is particularly true as to China. We may differ at times as to the best method of helping the Chinese to attain political and economic stability but our fundamental aims are identical—the up-building of a prosperous and contented nation.

It is most significant that Ambassador Castle should make this speech at a moment when Japan is becoming self-sufficient as an industrial nation. Last year, for instance, Japan spent Y.163,000,000 on railway materials of which only one per cent was imported. American manufacturers are exporting machinery and electrical equipment to Japan in decreasing amounts but American bankers are exporting American capital to Japan and the day that Sino-Japanese diplomatic questions are amicably settled, as they are bound to be with good sense on both sides and American influence pledged to support a settlement, then Japanese manufacturers will develop the China market for materials which hitherto Japan herself imported. And into those materials, will go American capital, American raw materials, American experience as well as Japanese, because both countries are developing an economic co-operation which will have as its basis the industrial independence of Asia. This policy is in harmony with modern American economic thought, for the United States does not believe in a policy of dumping goods; rather do American industrialists open factories, most often in partnership with local industrialists, for the manufacturing of commodities. The United States exports capital, experience, raw materials, but it does not seek to prevent local people from developing their own industries. This has been the American practice in Europe since the Great War; it is now the American practice with regard to Japan. It will become the American practice in China as soon as China can provide a system of law, an administration of law and justice, which will afford ample legal protection to capital invested.

At the very commencement of his address, Mr. Castle lays down a Monroe Doctrine for Asia—a surprisingly change of attitude on the part of the American Government. He said:—

“Just as we like to believe that the influence of the United States on the American Continent is a guarantee of peace, so do we believe that the power of Japan in the Orient, a power due to the vigor and forward-looking nature of its government and people, leads to order and progress and peace in the western Pacific.”

American-Japanese co-operation in China will benefit China. Surplus capital in China is almost non-existent. Whatever there is of it is invested in Shanghai real-estate and Government bonds, which means that there is at present little for the modernization of industry. In spite of all the opportunities offered China during the past two decades, except for a few textile industries, a few flour and cement mills, China’s industry is wholly undeveloped and primitive. With the Government still beset by the mere necessity of protecting itself from civil wars and rebellions, it is impossible

to devote more than a modicum of the revenue of the state to the development of commerce and industry. In fact, self-protection and self-perpetuation is and should be the first task of the Chinese Government during this period of transition of a chronic revolutionary to stabilized conditions. It is during such a period that the co-operation between Japan and the United States, advocated by Ambassador Castle may best serve China, for it affords an opportunity of united support rather than the complications of international misunderstanding and competition. It means that the two most powerful nations on the Pacific will join together to assist China. It removes all causes for China's dubiousness of Japan's sincerity. In fact, it lays the foundation for a union of interests among the United States, Japan and China, based upon good-will and national economic processes, which alone can fully assure the peace of the Pacific.

Mr. Castle's speech, in full, follows:—

It is a wonderful thing to be the representative in Japan of a nation desiring nothing except friendship; to come to a great sister nation which we know will return our friendship in full measure. The time of suspicion of each other's motives has happily gone by. Every nation works primarily for its own interests but I know of no pair of nations whose interests more thoroughly coincide than those of Japan and the United States. In endeavoring, therefore, to advance its own interests, each nation is helping the other. Just as we like to believe that the influence of the United States on the American Continent is a guarantee of peace, so do we believe that the power of Japan in the Orient, a power due to the vigor and forward-looking nature of its government and people, leads to order and progress and peace in the western Pacific.

The trade of both nations reaches out into the world—the trade of Japan toward the east as well as the west, and that of the United States toward the west as well as the east and south. But this trade should never bring conflict because the goods and the services of each country are necessary to the happiness and prosperity of the other.

There are pessimistic people who say that trade will be the cause of future wars. They do not mean the direct trade between any two countries but rather the rivalry in sales in a third country. This is the theme of many alarmists in America. Personally, I have never had any sympathy with talk of this kind. If world markets were strictly limited, if no expansion were possible, bitter rivalry might indeed develop. But everyone who knows anything about political economy understands that the sale of goods increases the demand; that as more and more things become necessary for happiness the people needing them build up their purchasing power through more intensive work and, through greater production of exportable surplus or through service, absorb even greater quantities of foreign goods. In other words, sales increase all along the line. Since the war, for example, the sale of American products has largely increased throughout South America but those people who talk about the danger of friction because American goods are replacing other foreign goods are talking nonsense. If these people would study the figures they would find that the general volume of trade has increased and that all have benefitted in equal measure.

Even more absurd, it seems to me, is the talk one sometimes hears of friction between Japan and America in the development of the great potential markets of China. There, more than anywhere else, should there be co-operation instead of rivalry. Just as we shall always work together to advance political stability in China so we must inevitably co-operate in the sale of our merchandise. Japan needs American raw material to manufacture what the Chinese want. America needs the good will of Japanese traders in China in the distribution of American-made goods. Both must gain if we work together as I believe we shall. I can see no possibility of friction in the growing trade of the two nations in all parts of the world but only of a fuller understanding and friendship. And this is particularly true as to China. We may differ at times as to the best method of helping the Chinese to attain political and economic stability but our fundamental aims are identical—the up-building of a prosperous and contented nation. I am sure that all that Baron Shidehara said in his address to the Diet on the question of China would be most warmly applauded in the United States. There are times, it is true, when certain Japanese suspect the purposes of America and when certain Americans suspect the purposes of Japan. But these certain Americans and certain Japanese are trouble-making people. It is our duty to see that they shall never instil suspicion into the minds of either government, thus disturbing the serenity of our relations. If, however, any dispute should ever arise we have Treaties binding us to confer, and, even if full and frank discussions through diplomatic channels should yield no settlement satisfactory to both sides, we must not forget that both nations, having abjured in the most solemn and emphatic manner an appeal to arms in such circumstances, would continue to seek peaceful methods for the solution of the difficulty. For this reason no American of any standing in his own country can think of using anything except these peaceful methods as a means of settlement. The idea is foreign to all American thought. Instead of this we know that peace is guaranteed in the Pacific because we know that both nations will show in the future the same fidelity to national commitments that they have shown in the past. We have no quarrel on the subject of China. I can see none even faintly looming in the distance.

So, also, we have common ideals in the great problem of limitation that the five naval nations are trying to settle in London. Japan and the United States, I am convinced, want not only real limitation but substantial reduction. The chief Japanese delegate, Mr. Wakatsuki,

said when he was in Washington that Japan wanted nothing for offense but a navy fully adequate for defense. That should be the aim—that and no more—of every self-respecting nation. Anything less than adequate defense endangers national life; anything more puts an unjust burden on the taxpayer and at the same time increases the danger of war. Naval armament needed for the purpose of national defense must be comparative, not absolute. If all the naval vessels of the world were sunk it would not endanger the national safety of any of us. Naval needs also are dependent on that less tangible but certainly no less important factor of trust and friendship. We do not carry guns to defend ourselves against our friends and in the growing cordiality of international relations I honestly believe that the big guns of our ships are becoming less and less important, less and less useful as the years go by. After all, the main objective in this London Conference and in the general diplomatic relations between nations is to insure a world in which we may confidently plan for peace; in which we can develop our institutions, educate our children, advance science and live normal, happy lives.

It is always well to remember that at this Conference in London whatever is done will be the voluntary act of the various nations concerned. No nation or group of nations can force any other nation to cut down its navy, because inherent in sovereignty is the right of a nation to have any navy it desires. Each one of us who is willing to limit the building of ships of war will do so because he is eager to cut the burden of taxation for his own sake, and in the wider and deeper sense to help on the great cause of world peace. Whatever may be accomplished in London, I am sure that no one will suggest to Japan any sacrifice that will either endanger its national security or challenge its preponderant naval strength in the Orient.

If the Conference is to be a success each one of us will have to give up something which we now believe that we need but the giving up will be general. No single nation will be asked to make all the sacrifices, and I often wonder whether what we think we want at the moment will be what we think we want ten years from now. In the endless forward march of science, in which Japan is taking so noteworthy a part, the seemingly perfect machine of to-day may be obsolete to-morrow. Think, for example, how aviation has changed the whole scheme of naval warfare. If the aeroplane is still, perhaps, negligible as an offensive weapon against a fleet, such as in the bombing of a battleship, it has acquired inestimable importance as the eye of the fleet. None of us can possibly foresee how far this single development will go; whether possibly before many years have elapsed an aeroplane may not be able to settle down quietly on the deck of the smallest ship as a dove lights on the dove-cot. When, if ever, this is true we may all find that we may want to build the smallest instead of the largest cruisers. I am suggesting this only because I think it shows how dangerous and unwise may be the stirring up of popular opinion by the press in any country of a sentiment in favor of any single type of ship. The American press, for example, has said so much about 10,000-ton cruisers that many people believe the London Conference will stand or fall on this type of vessel. Would it not be more accurate to say that the Conference will stand or fall in accord with the measure of good will of the participating nations? Here, certainly, Japan and the United States stand firmly together. Neither lacks good will. Each is willing to make sacrifices in a common cause because each realizes that such sacrifices are the proof of the international friendliness which is the only thing, in the final analysis, to insure world peace.

Already this growth of friendly understanding has been made manifest through such public expressions of the determination to settle all disputes without recourse to war as the Kellogg Pact, the League of Nations, and the World Court. These public declarations of policy along with the rapid extension of treaties of conciliation and arbitration, are surely symptoms of better international feeling and are therefore rightly made the starting point of the deliberations in London. If we have agreed to live in peace surely we can discard some of the weapons we have forged against each other.

The President did not send me to Japan to insist on the American point of view in such controversial matters as may arise. He sent me in order that there should be in Tokyo someone who could frankly and fully express his ideas on the various questions which will come up in the London Conference. I said to him before leaving Washington that I was sure my mission would be one of co-operation. In that he heartily agreed. Our work must be that of co-operation for the reason that we are equally eager to make this Conference a success for our own sakes, since we always rightly think first of our own country, but no less truly for the whole world. Patriotism can never be purely selfish, because if it is it will not really help us forward. In the old days I think nations were inclined to consider themselves happy in comparison with the misery of other nations. To-day we know that only the happiness and prosperity of others can make our own countries truly prosperous and happy. Co-operation is far finer than rivalry and its rewards are infinitely greater.

I suppose there will always be matters of dispute between our two countries and I am not at all sure that I should want it otherwise. Nations, after all, are much like individuals. National characteristics are like the human traits of different men. Each one of us has his friend. Each one of us, if he is fortunate, has a few really intimate friends. But we all know that friends have their disagreements. If they do not it simply shows that they lack definite character. No two men of strong and virile character can possibly agree about everything. In the same way no two strong and virile nations like Japan and America can possibly agree about everything. But, as honest discussion between friends—each yielding something, each securing something—only strengthens friendship, I see no reason why the same should not be true as between nations. We should not thoroughly respect each other if we had no strongly held individual ideas.

(Continued on page 54).

Baron Shidehara on China

BARON Shidehara's address before the Japanese Diet on Japan's foreign relations is not only a masterly description of conditions in China but it clearly enunciates Japan's foreign policy, in particular *vis-a-vis* China and Soviet Russia. There cannot possibly be a misinterpretation of this policy, for Baron Shidehara states the case of his country completely and without the slightest reservation. He deals with facts and purposes and he destroys rumor and subversive propaganda. He goes to the heart of each problem and offers the solution. It is a state document by a truly great man, a friend of China and the Chinese people, a patient friend, who is prepared to bide his time while China works out her own salvation. There is only this phase of the problem which gives Baron Shidehara cause to pause:

We cannot, however, dismiss from our mind an apprehension borne out by various instances in history that in any country faced with similar troubles, the temptation may grow strong for men in power to resort to an adventurous foreign policy with a view to diverting the minds of the people from internal to external affairs. It would be needless to point out that, in our modern world, a policy repugnant to all sense of reason and moderation can scarcely tend to enhance the prestige of a nation, or to serve the purpose for which it is intended. I sincerely trust that the responsible statesmen of China will avoid all such temptations, and will proceed to work out their own country's destiny by steady and measured steps.

It is sincerely to be hoped that Baron Shidehara's plea for the avoidance of this temptation will be taken seriously. There can be little doubt that this method has at times been used in China, but it is a question whether any leader in Nanking would consider such a plan at this time, for the risks are too great and the articulate elements among the Chinese people are too keenly concerned now with internal problems, questions of party organization, questions of constitutional changes to permit themselves to be diverted by the trivialities of foreign affairs. That is why the Extraterritoriality Mandate last December was received so coldly, it really fell on deaf ears. For what the Chinese care about most is not extraterritoriality, but peace, order, good government, trade—but most of all, peace.

There is, of course, an element in China which thrives on anti-Japonism, just as there has always been. After the Tsinan Affair, these elements had their opportunity. Again when Mr. Obata was appointed Minister of China, they embarrassed their Government by the violence of their attitude, but their influence is fortunately on the wane and it is to be hoped that at the Third Plenary Session of the Central Executive Committee, which is to occur in March, certain reforms will be made which will strengthen the responsible elements in the Government and lessen the authority of those who thrive on disorder.

Japan's friendship for China, Japan's patience with China, Japan's willingness to meet China more than half way appears in every line and every phrase of Baron Shidehara's speech:

If only out of sympathy for a neighboring nation laboring under one-sided limitations upon its sovereignty, as we have ourselves experienced at one time, it is but natural that we should make up our mind to help China by all the means at our disposal for an early removal of these restrictions.

Nevertheless, Japan cannot disregard the elemental duty of protecting Japanese subjects wherever they may

be. This is in harmony with the American policy enunciated by President Coolidge and it is presumably also the policy of Great Britain.

For it is obviously the duty of every government to look to the safety of its nationals residing abroad, and to protect the important economic interests of its own country.

In spite of all that has occurred Japan is prepared for the gradual abolition of extraterritoriality. The mandate of December 28, unilaterally abolishing extraterritoriality came as a surprise to Japan; nevertheless, the Japanese are prepared to go on with the negotiations. Baron Shidehara discloses the startling fact that this mandate has not been communicated to the foreign powers.

He says:

The Mandate of December 28 has not been formally communicated to any foreign government; nor does it seem to be sufficiently explicit in meaning. At any rate, I can hardly bring myself to the conclusion that the Chinese Government, in issuing such a Mandate, had in mind a policy subversive of the laws and usages of international intercourse. In point of fact, neither Japanese nor any other foreigners in China who have hitherto enjoyed extraterritorial privileges have as yet been subjected to the exercise of Chinese jurisdiction.

Perhaps there was a greater wisdom in Nanking than appeared to those of us who live in China, for by not communicating the Mandate, it was possible to open negotiations which otherwise would have proved very embarrassing.

With such a man as Baron Shidehara in the Foreign Office in Japan and with an increasing willingness among responsible officials in Nanking to take a broad view, there is reason to expect a greater sanity in Sino-Japanese relations. For both the Chinese and the Japanese must realize that upon the friendship of these nations depends the peace of the Pacific.

Baron Shidehara's address, in full, follows:—

In China, endless scenes of internal commotion and strife have in the past from year to year presented themselves. They have not only caused untold misery and hardships to the Chinese people themselves but have also exercised a most harmful influence upon our political and economic relations with China. Nothing was more gratifying to us than to witness the measure of success which the Nationalist Government, through tremendous efforts, was able to attain in 1928 in the great enterprise of effecting a national unification. Having regard, however, to the historical and geographical background of China, and other conditions surrounding her, we are not blind to the many difficulties with which any attempt at the establishment of peace and unity in all parts of the vast country will necessarily have to grapple. As a matter of fact, the political situation in China began once more to show signs of unrest in the spring of last year. Recent indications are more reassuring, but the future alone can tell if the crisis has been averted once for all.

We in Japan have only to look forward with sympathy and patience to the achievement of their task by those who have been devoting their attention and energy to compose China's existing difficulties. We cannot, however, dismiss from our mind an apprehension borne out by various instances in history that in any country faced with similar troubles, the temptation may grow strong for men in power to resort to an adventurous foreign policy with a view to diverting the minds of the people from internal to external affairs. It would be needless to point out that, in our modern world, a policy repugnant to all sense of reason and moderation can scarcely tend to enhance the prestige of a nation, or to serve the purpose for which it is intended. I sincerely trust that the responsible statesmen of China will avoid all such temptations, and will proceed to work out their own country's destiny by steady and measured steps.

The future of Sino-Japanese relations is variously viewed in this country. There are



Baron K. Shidehara, Minister of Foreign Affairs

pessimists who maintain that, however fair and liberal a course Japan may steer, China will never meet us half way, but will be swayed by considerations of domestic politics and assume towards us an attitude more wanton than ever, which would only be calculated to aggravate the situation. Others entertain a more optimistic view. They hold that all the suspicion and mistrust which the Chinese people have hitherto harbored toward Japan rest on no substantial grounds, and that, with a better understanding on China's part of our real motives, there must come a better relationship between the two peoples. They further anticipate that the stabilization of the internal political status of the Chinese Government will be followed by a reorientation of China's foreign policies upon more moderate and normal lines.

I am not here to pass judgment either way upon these conflicting views. In any case, whatever response we may receive at the hands of the Chinese, we are determined to exert our best efforts to regulate our relations with China on a basis which we believe to be just and fair. Our peculiarly close relations with China, and more especially the complexity and variety of their ramifications, are naturally bound to give rise to questions from time to time calling for diplomatic treatment, and tending to excite the feelings either of the Japanese or of the Chinese people.

If, however, one takes a broader view of the future well-being of both Japan and China, one will be satisfied that there is no other course open to the two nations than to pursue the path of mutual accord and co-operation in all their relations, political and economic. Their real and lasting interests, which in no way conflict but have much in common, with each other, ought to be a sufficient assurance of their growing rapprochement. If the Chinese people awaken to these facts and show themselves responsive to the policy so outlined, nothing will more conduce to the mutual welfare of both nations. Should they, on the contrary, fail to understand us, and seek trouble with us, we can at least rest assured of our strong position in the public opinion of the world.

With regard to the question of the so-called "unequal" treaties the course which we propose to follow may be inferred from what I have tried to describe as the guiding spirit of our policy towards China. For a long time, it is true, peace and order have not been established in China, the authority of the central government has been questioned in the provinces; the lives and property of foreigners resident in China have time and again been menaced; assurances contained in international treaties have repeatedly been disregarded. These facts have no doubt weakened the case of China in her demand for the abolition of what her people regard as "unequal" treaties. For it is obviously the duty of every government to look to the safety of its nationals residing abroad, and to protect the important economic interests of its own country.

On the other hand, placing ourselves in the position of the Chinese people, we can well appreciate the feeling of injury with which they regard the continued existence of these treaties hampering their national life. Nor can the recent emancipation of other Asiatic nations from the limitations of similar treaties have failed to add to the poignancy of their feeling. In the face of such deep discontent rankling in the heart of a nation, it is not the part of constructive policy for us to remain indifferent and to do nothing to alleviate the grievance. If only out of sympathy for a neighboring nation laboring under one-sided limitations upon its sovereignty, as we have ourselves experienced at one time, it is but natural that we should make up our mind to help China by all the means at our disposal for an early removal of these restrictions.

While we are thus quite willing to offer assistance to China in order that she may be placed on an equal treaty footing with all foreign powers, we owe it to ourselves to seek adequate assurances for the safety of our nationals residing in China and for the protection of the important economic interests which Japan possesses in relation to that country. It ought not to be difficult for the Chinese people to realize what we have in mind, if they only recall the whole-hearted co-operation which the Japanese representatives extended to the Chinese throughout the whole course of the Peiping Tariff Conference and of the sittings of the Commission on Extraterritoriality in 1925-1926.

The attitude which was then taken by Japan is the attitude which she is now taking in the handling of the question of "unequal" treaties. In that spirit, we gladly accepted as early as in 1926 the Chinese proposals to open negotiations for the revision of the Sino-Japanese Commercial Treaty. These negotiations have subsequently been dropped on account of political upheavals in China. In April of last year the two governments entered into an engagement for the opening of fresh negotiations. Through various unforeseen circumstances, formal conversations have not yet been initiated. In particular, the death of Mr. Saburi, who, as Japanese Minister, had been loyally and conscientiously executing the policy of the Government in the interest of friendly relations between Japan and China, has caused a most unexpected hitch in our program. In spite of these incidents, an early adjustment of the question of treaty revision has at all times been engaging our serious attention.

Of the clauses contained in the so-called "unequal" treaties, that which relates to extraterritoriality forms a most important objective of the present popular agitation in China. Our position in this matter has throughout been governed by the line of policy enunciated above. That China alone of all nations is to-day denied the exercise of jurisdiction over foreigners within her own territory is indeed an anomaly. It is, however, wide of the mark to ascribe the cause of such an anomaly to the sheer conservatism of any Power. It cannot be denied that hitherto China's judicial system has labored under many serious defects, such, for instance, as its lack of independence from the interference of the administrative and military authorities, and the absence of basic regulating the rights and obligations of individuals. It is true that various codes of law have recently been promulgated or are about to be promulgated; but, in view of their far-reaching importance, it will be readily conceded that, before they are put in operation, a suitable period of time should intervene.

These practical considerations have naturally deterred the governments of the countries having important interests at stake from acquiescing in an immediate abolition of extraterritoriality. A satisfactory settlement of this question can be attained only through friendly negotiation and under-

standing between China and the Powers concerned. In fact, these Powers have one and all declared themselves ready to enter into negotiations with China to bring about the desired adjustment.

The Nationalist Government, however, in its mandate of the 28th of December last, proclaimed as follows:—

For the purpose of restoring her (China's) inherent jurisdictional sovereignty, it is hereby declared and determined that on and after January 1, 1930, all foreigners in the territory of China who are now in the enjoyment of extraterritorial privileges shall abide by the laws, ordinances, and regulations duly promulgated by the central and local governments of China. The Executive Yuan and the Judicial Yuan are hereby ordered to instruct the ministries concerned to prepare as soon as possible a scheme for the due execution of this mandate and to submit to it the Legislative Yuan for examination and deliberation with a view to its promulgation and enforcement.

As a matter of principle, the proposals for the abolition of the system of extraterritoriality in China have met with no opposition from any of the Powers concerned, since the time of the Washington Conference. It is, however, self-evident that the method and process of its abolition should be determined in common accord by China and the treaty Powers. That point is, moreover, made abundantly clear both in the Washington resolution itself and in the report of the Commission on extraterritoriality of 1926, which was signed by the Chinese Commissioner along with his colleagues from the other countries concerned. The Mandate of December 28 has not been formally communicated to any foreign government; nor does it seem to be sufficiently explicit in meaning. At any rate, I can hardly bring myself to the conclusion that the Chinese Government, in issuing such a Mandate, had in mind a policy subversive of the laws and usages of international intercourse. In point of fact, neither Japanese nor any other foreigners in China who have hitherto enjoyed extraterritorial privileges have as yet been subjected to the exercise of Chinese jurisdiction.

A brief reference to the recent complication between China and the Soviet Union concerning the question of the Chinese Eastern Railway may not be out of place here. It is not for us to examine the merits of that dispute. We are, however, specially interested in the maintenance of peace in this part of the world. We could not but view with grave concern the developments of the situation following the rupture of diplomatic relations between our two neighbors which took place in July of last year, which might conceivably have drifted into a state of war.

On July 19, the Ambassador of the Soviet Union called at the Foreign Office to inform me of the severance of relations with China. Availing myself of that occasion, I orally invited the attention of his government to the provisions of the Treaty of Paris for the Renunciation of War and expressed a strong hope for the settlement of the controversy by all peaceful means. A similar expression was also conveyed to the Chinese Minister, whom I saw on the same day.

Being persuaded that direct negotiations between the parties in dispute could alone lead to a satisfactory adjustment of the question, I made it a point, as far as I could properly do so, to bring about their mutual approachment. With that end in view, I constantly kept in touch with their respective representatives in Tokyo, and, on several occasions, I spoke my mind freely and informally both to the Soviet Ambassador and to the Chinese Minister, and asked them for information. In all cases, we have consistently maintained an attitude of absolute impartiality and disinterestedness, and I am confident that both the Nanking and Moscow Governments fully recognize the singleness of mind and of purpose, with which we have all along looked forward to a pacific solution of the differences between them.

Towards the latter part of November last, when the military situation around Manchuli assumed a threatening aspect, the Government of the United States addressed a formal communication separately to the Chinese and Russian Governments, calling the serious attention of those Governments to the provisions of the Kellogg Treaty and at the same time suggested to all the countries signatory to the Treaty that they should take a similar action.

It is perfectly natural that America, as the initiator of the Treaty, should feel called upon to take such an action and we fully appreciated the motives by which it was prompted. We ourselves would be unable to remain a silent spectator, if this treaty, on which the ink is scarcely yet dry, were in fact to be reduced to a dead letter. Having, however, been in close contact with the Governments of China and of the Soviet Union in this matter, we felt that, at least the time was not yet ripe for a formal "démarche" of the nature proposed. Moreover, Japan maintains normal diplomatic relations with the Soviet Union as well as with China. Should we join in the action suggested we might find ourselves unavoidably drawn into a discussion with the Russian and the Chinese Governments, on the merits and demerits of the issues raised, and we might thus be eventually constrained to proceed to further action in regard to one or both of the two parties in dispute in order to make our "démarche" effective. It was due to these considerations that we did not feel ourselves at liberty to act at once upon the American suggestion.

Direct negotiations have since been opened between the two Governments, resulting in a preliminary agreement. It is now understood that a formal conference is shortly to be held in Moscow. We sincerely congratulate the two nations upon this happy issue. In passing, I may here refer to the injuries sustained by certain Japanese in the district affected. Unfortunately, one Japanese was killed and another wounded on the 19th of November last, in consequence of the Russian bombardment of Manchuli. Upon being informed of this incident, the Soviet Government promptly expressed regret to this Government and undertook to pay due compensation for any injuries sustained by the Japanese. So far as we are aware, there has been no other case involving loss of Japanese life as a result of the military operations of the Chinese and of the Russians.

Friendly relations between this country and the Soviet Union have recently, in many respects been gaining in strength. We are confident that, so long as neither of them attempts to interfere with the political and social order of the other, the two nations may live at peace and in good neighborly accord with each other. The speculation seems to be still lingering in some foreign quarters that Japan and the Soviet Union may some day come

to blows on some Manchurian question, while another story has been circulated abroad to the effect that the two countries have entered into a secret understanding on their mutual policies towards China. All these reports are too absurd to call for any refutation.

The attention of the whole world is now centered upon the Naval Conference, which is to meet to-day in London. At the Washington Conference, an agreement was arrived at for the reduction and limitation of the strength of capital ships and airplane carriers for each of the several Powers concerned. It put an end to all building competition in these categories. No such agreement came into being at Washington in regard to auxiliary craft. That Conference only succeeded in limiting to eight inches the calibre of guns to be mounted on cruisers and in defining the maximum tonnage of cruisers as ten thousand tons. The remarkable progress since made in the manufacture of armaments rendered it possible for a cruiser, within the limitations of the Washington Treaty, to possess enormous fighting power. It then became increasingly evident that provision should be made for the prevention of competition in cruisers. In view of such popular demand for such an arrangement, Japan, Great Britain and the United States met in conference at Geneva in 1927. The meeting ended in failure, to the great disappointment of the general public.

In the course of last year, the problem of naval disarmament was again brought to the fore, with the inauguration of President Hoover in the United States and the coming into power of the Labor Party in England. The result is the calling together of the present Five-Power Conference at London.

The invitation to this conference by the British Government under date of October 7 of last year and our reply thereto dated the 18th of the same month were respectively published at the time. The contents of that correspondence need not be repeated here. I only desire to make a few observations on the political significance of the present conference and on the nature of the so-called naval ratio.

In the first place, we take it that the Conference is intended to attain an agreement among the principal naval Powers to regulate their respective naval strength in such a way as to secure to each Power the integrity of its national defenses and a reduction of naval expenditure, and to promote mutual relations of peace and friendship. Therein lies the political significance of the London Conference.

No nation can be expected to subscribe to an agreement that might jeopardize its own security. But it must be remembered that the amount of naval strength needed by one Power is in an important degree relative to that possessed by other Powers. It ought, therefore, to be possible for all the nations concerned uniformly to reduce their respective naval strength to a certain extent and so to relieve the burden on their peoples, without involving, for any single nation, any sacrifice of the integrity of its national defenses. Such a result is, needless to say, attainable only through international agreement.

In the absence of such agreement, the reduction of naval strength which any particular nation may effect of its own accord, in pursuance of the highest ideals, will not necessarily be followed by a corresponding step on the part of other nations. Given the assurance of agreement, however, all nations can safely diminish their naval armament. In their mutual relations, too, groundless fears will give way to trust and friendship; the cause of peace among the nations will in that way be signally promoted.

Secondly, the nature of the so-called "ratio of naval strength" should be clearly understood. There are those who are disposed to look upon the naval ratio as a standard by which to gauge the international standing of a country. In their view, a Power possessing warships in larger numbers or to a heavier tonnage is entitled by that fact and to that extent to the higher esteem of the world. Such an approach to the question would render impossible any agreement upon "ratio," which in the nature of things presupposes gradation in naval strength. All nations being equal in international status, they would no doubt be justified in claiming equality in naval strength, if the amount of such strength were to decide the position of each Power in the hierarchy of states.

Our claim to a definite amount of naval strength is in no way influenced by such sentimental considerations. It is based upon the practical necessity of making our defenses secure against foreign invasion. We offer no menace to any nation; we submit to menace from none. On that fundamental principle, it is our desire to secure a naval arrangement satisfactory to all parties concerned.

We must not shut our eyes to the manifold difficulties which will have to be surmounted before the present Conference can be brought to a successful conclusion. The magnitude of the task before the London Conference can hardly be over-estimated. The problem which the Washington Conference left in its wake and which at a later date the Geneva Conference failed to adjust, has now to find a solution at London once for all. But to-day the public opinion of the world is calling in sober earnest for the security and happiness of national life and for peace and friendship in international relations.

Should the London Conference take this tide at its flood, its labors will surely be crowned with success. The nations there represented can ill afford once more to disappoint this public demand. The Washington Conference opened a new chapter in the history of human progress. We expect the same measure of achievement to result from the international assembly now meeting at London.

Our relations with the countries of Europe and America are developing in a uniformly satisfactory sense. With none of them have we at present any questions of serious difficulty to settle, nor do we anticipate any. It is true that to our regret the question arising from the "discriminatory clause" contained in the American Immigration Act of 1924 cannot yet be regarded by us as a closed incident. We are satisfied, however, that a solution of this problem must after all flow from the friendly understanding between the two peoples."

It is patent to every one that such an understanding has of late made marked progress. The cordial reception accorded everywhere both by officials and the public in the United States to our representatives at the London Naval Conference when they recently passed through that country constitutes more than a casual expression of American friendship. It testifies to the increasingly deep-seated sentiments of good-will which the American people in general have come to entertain towards Japan.

I would add a few words regarding the general trend of economic relations among the nations. In the days immediately following the Great War, various countries sought to heal the economic wounds sustained by them through the war, by stimulating the growth of their domestic industries, on the one hand, and on the other, by rearing high their tariff walls so as to prevent the import of foreign goods. If all nations were to adopt such a policy, no foreign markets would be open to their products and there would soon ensue a general over-production and a universal economic depression.

In the face of such deplorable conditions, which have actually manifested themselves, nations have effected tariff agreements, mutually reducing the rates on particular items of import. Treaties have also been concluded, or are in contemplation, under the auspices of the League of Nations, with the object of removing various impediments to international trade. In certain important industries, systems of cartel, both national and international, have also been devised in order to protect those industries from ruin.

In view of such tendencies, Japan should pursue no policy of economic exclusivism, but should put forth her best efforts in the development of her trade with all nations on the basis of a reciprocal promotion of interests. Without the expansion of foreign trade, there is no possibility of her international balance sheet being improved, nor can we expect to succeed in solving the problem of population and subsistence.

The question of how to develop our trade has thus become one of supreme importance. In so far as it belongs to the functions of diplomacy, it should be the primary duty of the Government to secure for its nationals free and equal opportunities in the international field of trade and investment and to accord them the necessary protection and assistance. It is partly in pursuance of this policy that we have been endeavoring to conclude commercial arrangements with countries with which we have hitherto had no treaty relations. In any case, the development of trade rests essentially on the individual initiative and efforts of those who are engaged in it. We must, therefore, look for increased activities of our people in that direction, believing as we do that upon such activities depends, in a large measure, the future of this nation.

Most Important American Pronouncement on Far Eastern Affairs

(Continued from page 51).

After all, then, what we both must do—Japan and the United States—is to be each its individual self, forgiving and understanding; each conscious of its own purposes, each realizing that it has something profoundly important to learn from the other and something equally important to teach the other. Each of us has a mission to perform. Although they are not conflicting missions, each will be carried out in accord with national character. If I can do my bit to forward this mutual understanding, to give impetus to the solidarity of the purpose we both so strongly have, to promote world goodwill and world peace I shall be more than satisfied. But my mission will not end in Tokyo. If I can prove my real friendship and admiration for Japan by promoting this friendly co-operation so important for us and for the world during the years to come in Washington. I shall feel that life has been world living.

Dutch Borneo Oil

It is learned that the Borneo Oil Company, in which the Mitsui Bussan Kaisha is interested, is in 1930 starting the intensive exploitation of three concessions, granted by the Government in last October north-east of Samarinda, Dutch Borneo.

The prospects are so promising that the Java-China-Japan Line is considering running a special steamship service. Furthermore it is learned that the Government has granted a number of old concessions in Dutch Borneo to the Netherlands Colonial Petroleum Company (a sub-company of the Standard Oil Company) and the Bataafsche Oil Company (Royal Dutch).

Mantell on the Nanking-Shanghai Railway

American Advisor's Sharp Criticism



R. J. J. Mantell, a practical American Railroad man, retained by Mr. Sun Fo, Minister of Railways in China, has submitted to the Ministry of Railways, nine reports. Eight of them deal with the lines he investigated; the ninth is general on the entire system. Mr. Mantell was unable to inspect the Lunghai Railway because of the military situation in China. The first report released by the Ministry of Railways was that which covered investigations on the Nanking-Shanghai and Shanghai-Hangchow-Ningpo Railways.

The Nanking-Shanghai Railway was begun in 1904 and was opened in April 1908. The finances for the railway were secured by a loan from the British and Chinese Corporation which is a joint undertaking of the Hongkong and Shanghai Banking Corporation and Jardine, Matheson & Co., the great British merchandizing firm. There were three issues of mortgage bonds, totalling £3,050,000; the amount outstanding on December 31, 1927, being £2,900,000 and there was a default on June 1, 1927. The Chinese Government investment in the line amounts to Mex.\$5,686,900.47. The security for the foreign loans are the railway, its property and equipment. The entire transaction is covered by a loan agreement and a working agreement which were not modified until January 1930, when the following correspondence was exchanged between the Ministry of Railways and the British and Chinese Corporation:

Shanghai, January 22.

H. E. the Minister of Railways, Nanking.

Sir,—As a result of negotiations in London between Your Ministry's Representative, Mr. Jun-ke Choy, and this Corporation, on the subject of Nanking-Shanghai Railway administrative questions and the Purchasing Agency, I am instructed by my principals to address to Your Excellency the enclosed two letters which I have been duly authorized to sign as representative of the British and Chinese Corporation, Ltd.

I have the honor, etc.,

The British and Chinese Corporation, Ltd.

ALEC L. DAVIDSON,

Representative.

"As Representative of the British and Chinese Corporation, Ltd., I have the honor to place on record, for facility of reference, the conditions of management of the above named railway which have recently been clarified by mutual understanding between your Ministry and the Corporation, acting as Trustees for the bondholders and the holders of net profit certificates.

"(1) In furtherance of the policy of direct operation of the Railway by the Ministry and for carrying out the responsibilities imposed upon the Board of Commissioners under Article 6 of the Loan Agreement, the Ministry of Railways shall appoint a Representative who shall be acceptable to the Corporation, to be Chairman of the Board of Commissioners and to exercise the functions of the Board.

"(2) The Ministry of Railways through its Representative shall administer the railway in accordance with the Loan Agreement and the Subsidiary Agreement of June 10, 1924, and shall control the appointment of all the officials and employees of the railway, except that in the case of the Engineer-in-Chief and the Chief Accountant, these officials shall be nominated by the Corporation for appointment by the Ministry. It shall be the duty of these officials to report to the Representative of the Corporation upon the affairs of the railway, and the Representative of the Ministry will consult with these officials upon technical and financial matters affecting the operation of the Railway.

"(3) The Board of Commissioners shall meet to receive, consider and pass the annual report and accounts of the railway, and this meeting shall take place as soon as possible after the conclusion of each financial year. Special meetings may be called at the request of two members, provided that the object of such meeting is notified to members of the Board one week in advance of the date of the meeting.

"The Board of Commissioners may at any time call upon the Representative of the Ministry to report to them in writing upon the affairs of the Railway.

"(4) The Engineer-in-Chief of the Nanking-Shanghai Railway is *ex officio* concurrently Engineer-in-Chief of the Shanghai-Hangchow-Ningpo Railway and, in the event of his absence on leave, or from other cause, his duties shall be temporarily performed by the Personal Assistant, who shall be entitled Deputy Engineer-in-Chief and shall be a British Engineer.

"The above conditions of management of the Nanking-Shanghai Railway which result from the principle of direct operation of the railway by your Ministry are accepted by the Corporation with a desire to assist in the aims of your Ministry for achieving the greatest possible efficiency in the management of the railway. I shall be obliged if your Excellency will confirm the understanding reached in these conditions."

(SECOND LETTER)

"As Representative of the British and Chinese Corporation, Limited, I have the honor to state that, in order to meet the wishes of the Ministry of Railways, and in consideration of the creation of the Central Purchasing Department of the Ministry, this Corporation is prepared to relinquish its rights, under Article 9 of the Loan Agreement, to receive (for its superintendence and services) the remuneration of 5 per cent. on the entire cost of materials purchased for the Railway.

"For their services as trustees for the bondholders and agents for the Railway, it is understood that the Ministry of Railways will pay to the Corporation the remuneration of £3,500 per annum during the terms of the Loan Agreement, and the Corporation agrees to superintend and serve in connection with the purchase of materials, whenever called upon to do so by the Ministry, without extra remuneration. The above remuneration will be paid to the Corporation half yearly from the revenues of the railway on the dates of payment of interest on the Loan, viz: on May 18 and November 17.

"I shall be obliged if Your Excellency will confirm the understanding reached on those terms."

The Ministry of Railways officially announces that the understanding reached on those terms between the representatives of the Ministry and the British and Chinese Corporation, Limited, has received the approval of Mr. Sun Fo, Minister of Railways.

The Shanghai, Hangchow and Ningpo Railway is an amalgamation of three lines: the main line is the Chekiang provincial railroad; there is a connecting line with the Nanking-Shanghai Railway and a branch line, branching out of Ningpo. This railway should, in fact, be a part of the Nanking-Shanghai Railway, the whole providing a unit line in Kiangsu and Chekiang, but because of loan arrangements, the lines have maintained a separate identity.

The Shanghai-Hangchow-Ningpo Railway was built by Chinese engineers, assisted by a British engineer. It is mortgaged to the British and Chinese Corporation for £1,500,000, the amount outstanding on December 31, 1927, being £862,500. The Chinese Government investment in the line is Mex. \$17,657,509.75. The British and Chinese Corporation's mortgage is secured by the Railway property and revenues and surplus earnings of part of the Peking-Mukden Railway.

For many years, these two railways were regarded as the best managed lines in China, although there has for years been disagreements between the British general managers and the Chinese Managing directors. This disagreement reached its apex in 1929 in differences between Mr. Jun-Kee Choy, the Managing Director and Mr. A. C. Clear, the British Managing Director which resulted in Mr. Clear's resignation.*

Mr. Mantell's investigation must be regarded as impartial and scientific. It will be found that he has been critical, but he has been no less severe with other lines. Mr. Sun Fo has inherited a broken-down railway system which he is seeking to rehabilitate and it is of no advantage to him, to the Ministry of Railways, to China or to anyone else to suppress the facts. Nor can there be any re-financing or improvement until all the facts are made public.

In the covering letter to his report, Mr. Mantell makes the position of this railway perfectly clear in the following paragraphs:

In conducting the survey of these railways it was very apparent that the railway affairs were being handled on a very improper business basis. Unnecessary waste of money was apparent and an exceedingly large number of employees was at work in the different departments to produce a given effort.

The over-staffing of the railways and the lack of proper supervision and instruction would make it difficult to make recommendations for improvement before conducting a careful and detailed diagnosis.

Mr. Mantell cannot avoid discussing the inefficient utilization of labor, the duplication of work, and the lack of modernization of business methods. As regards the so-called cheapness of Chinese labor, Mr. Mantell's comments are particularly interesting:

You will note in the report for different basis items of expense comparison is made with representative American Railroads in different sections of the country. American labor receives from eight to ten times as much wages as Chinese labor employed in similar capacities and where the cost of producing the item is principally labor, American railway items which are available for comparison are cheaper, not considering the exchange.

*For the details of this, see the *Far Eastern Review*. May and July 1929.

	Cost of labor per equated track mi.	Man hours of sec. men per equated track mi.
Nanking-Shanghai ...	\$865.00	11,700
S.H.N.R. ...	810.00	13,104
Nor. Pacific ...	426.00	1,414
Seaboard Air Line ...	425.00	1,477
Central of Geo. ...	504.00	1,825
Great Northern ...	554.00	1,439
Burlington ...	700.00	1,783
Chicago G.N. ...	770.00	1,993
" N.W....	791.00	2,239
Milwaukee ...	700.00	1,783

According to Mr. Mantell:

The actual business done in 1923 was greater than in 1928. These years can be very accurately compared for the reason that the railways were free from Military disturbances.

Conditions in 1923 indicated a railroad that was considerably over-staffed. In a report of this kind of course the question would arise, and it has come up, about the ability of the personnel. For the purpose of comparison I will disregard over-staffed railways in 1923, and compare 1923 with 1928 on a basis of effort expended.

The Nanking-Shanghai Railway reflects the following conditions.

1923—11,035,370 passengers were carried.
1928—10,661,405 " " "

Of the total revenue as between passenger and goods, passenger revenue represents 83 per cent. in 1928.

Revenue Received per Passenger Kilometre.

Increased 31 per cent. in 1928 over 1923

Average Haul Per Passenger.

Increased 22 per cent. in 1928 over 1923.

There was an increase of 18 per cent. in passenger kilometres run in 1928, which was not performed to reduce overcrowding of trains, as the figures show that the average passengers per train kilometre was practically the same.

It is apparent that the increased revenue was due almost entirely to increased passenger fares, and increased haul per passenger, and does not represent an increase in the passenger business of the railway.

Goods Traffic.

1923—354,610,798 ton kilometres were handled.
1928—272,450,274 " " "

There was an increase in 1923 over 1928 of 30 per cent. in ton kilometres handled.

In spite of the fact that the same amount of passenger business was handled and a heavy reduction in the freight business, the number of employees on the pay roll during this period increased 19.5 per cent.

There is a very complicated wage schedule in effect on the above railways which should be modified by simplification of rules and wage scales. The wage scale will be dealt with separately. It would be useless to compare the operation of this railway with anything approaching a modern scale. Inefficiency of management is so clearly reflected; up-keep neglected; and practically no effort exerted to create new business, particularly goods business, for both railways.

In spite of these conditions, the rates charged on this railway are exceptionally high:

There are four classes of passenger rates on the Nanking-Shanghai Railway. The 1st class rate is based on 5.93 cents per mile.

On American Railways the 1st class fares are based on 3½ to 3¾ cents per mile.

These railways have not been developed in a manner in which they should have been for economic administration, transportation, and development of new business, particularly goods business, and establishment of rates to meet the conditions of the traffic, or in other words, to some extent what the traffic will bear.

The question of double-tracking this line has long interested railway engineers and the public. Mr. Mantell's comment on the subject is as follows:

Grading and bridge work was completed many years ago between Shanghai and Soochow, a distance of 86 kilometres.

This involved a capital expenditure of around \$800,000.

It is difficult to understand expenditures of this kind which were not warranted at the time and to have permitted these bridges to remain unused these many years.

The bridges are now too light for recommended wheel load.

There is no necessity for double tracking this railroad at the present time. The statement of nine years' business would not indicate a necessity for doing this for the next 10 years.

It is believed, however, that with intelligent management and proper rates, the traffic of the railway can be developed, as well as the traffic from the North with installation of car ferry service at Nanking. Then there will be a necessity for double tracking in the next seven or eight years.

The business on the road, however, can be increased by the establishment of the Nanking-Pukow Ferry.

The direct line of the railways between Shanghai and Peiping is broken at Nanking on account of the Yangtze River. It is fairly easy to estimate that 25 or 30 years will go by before a bridge could be con-

sidered preferable to a bridge in the vicinity of Nanking. The absence of physical connection at this place constitutes a very serious defect in the railway system as a whole, and under authorization from the Ministry plans are being sent from America, showing methods and effect in crossing the Mississippi which in many respects is similar to the Yangtze.

Summarizing the question of locomotive performance, Mr. Mantell says:

It is to be noted that the total passenger, goods and mixed kilometres run in 1923 for the Nanking-Shanghai Railway was 8.8 per cent. more than in 1928, while service, assisting, light and shunting kilometres were 72.2 per cent. more in 1923 than in 1928. There was, however an increase of 28,012 tons, or 41 per cent., of coal used in 1928 over 1923, amounting to an increase cost of \$495,895.

The discrepancy in the performance of the locomotives of the Nanking-Shanghai Railway led to a most painstaking study of the coal problem. Mr. Mantell found:

There is a tremendous waste of coal on the part of firemen in stoking locomotives. The firemen have evidently never been instructed on scientific firing. In talking with Locomotive Division Superintendents this was confirmed. From 17 to 25 shovelfuls of coal are fired before closing the fire-box door. The firemen, as well as some of the division Superintendents, have no idea in regard to grate draft, fire door draft and creation of strong pressure drawing fine coal through the flues clogging up front end, etc. Scientific firing, combustion, burning of gases, is not practiced. There is also a lack of appliances which could be installed for about \$800.00 per engine which would save considerable fuel.

There is an estimated waste of from 15 to 20 per cent. in fuel due to lack of proper practical instruction of firemen.

Mr. Mantell also found inefficiency in the management and repairs of locomotives: He says:

With the large amount of money expended for Superintendence and excess labor each year, there has been very little money expended on new machinery, tools, etc., during the past several years.

The shop buildings and general arrangement are susceptible to re-arrangement and improvement without a large expenditure of money and which will provide for overhauling from 13 to 15 engines per month. This compares with four to five engines per month at the present time.

Mr. Mantell's discussion of the question of sleepers and rails is of especial importance because it affects the life of the railway.

For the nine years ending 1928 inclusive, \$2,369,376 was spent on the Shanghai-Hangchow Railway for sleepers. This line is equivalent to 182 equated track miles. It is noted that 17 per cent. sleepers were renewed each year for nine years, or 153 per cent. were renewed during this period.

Inspection of the Hangchow Railway does not show this heavy renewal of sleepers each year. Inspection, however, develops the cost of the heavy renewal was due to the poor judgment used in purchasing of sleepers.

From 1921 to 1924, 19½ per cent. Japanese Soft wood. 14½ per cent. Mixed Chinese Hard Wood and 44½ per cent. Tasmanian Soft Wood were applied without treatment, these sleepers having a life of only three or four years.

From 1925 to 1928, 61 per cent. Oregon Soft Wood and 39 per cent. of a poor quality Jarrah were applied without treatment.

This Railway should be easily maintained on an 8 per cent. sleeper renewal per equated track mile basis if a proper quality of timber was purchased similar to first class Jarrah that has been noted in the track here and there.

These sleepers being purchased at approximately \$6.50 a piece, with an average life of 14 to 15 years, the total average cost would have been \$162,786 per year, against the average of \$263,264 that was expended. This is calculated on an 8 per cent. renewal basis.

It is hard to conceive general conditions as outlined when one compares figures like these with the main track sleeper renewal on the Nanking-Shanghai Railway of a little over 2 per cent. per year during the past nine years.

It is clearly indicated that there is an excess \$100,000 per year uselessly spent on the item of sleepers, which would have more than paid for a proper maintenance of sleeper renewals as well as the installation of a modern Creosote treating plant.

There have been practically no new rails laid. The most ordinary track tools, such as track jacks are only available in a few gangs.

These Railways have been in operation for twenty-one years and the rails are getting thin here and there for safe operation, particularly with larger motive power units, and it will be necessary to develop a consistent programme to take care of rail renewals and the renewal of sleepers which are badly needed on the Nanking-Shanghai Line.

Mr. Mantell's recommendations as regards new rails and sleepers are as follows:—

Chinese standard rail section should be increased to 90 lbs. per yard.

The sleepers and rail conditions are not good on the Nanking-Shanghai Railway and in order to get a start on the rehabilitation of this line, at least 20 per cent. or not less than 104,790 sleepers should be put in next year. This will only provide for a little more than two new sleepers per rail length of equated track mile. In five years full renewal will have been made and this Railway can then go on a 7 or 8 per cent. renewal basis per equated track mile. Safety conditions demand this as a minimum requirement.

On the Shanghai-Hangchow and Ningpo Railway it is not necessary to provide over 8 per cent. per equated track mile for sleeper replacements. As the rail on both these lines will be practically worn out by 1933 or 1934 and some of it is now below safety factor, a constructive program should be worked out to provide for at least 8 per cent. renewals of main track rail, using the better class of rail released for sidings, etc. This only provide for a slow process of rehabilitation. The permanent way labor waste if reduced and other savings that can be effected by ordinary methods of management will more than offset increased expenditure incidentals to renewal of new sleepers and rails.

The following summarizes Mr. Mantell's conclusion :—

The Nanking-Shanghai Railway and the Shanghai-Hangchow and Ningpo Railway have outstanding obligations on the property of Mex. \$33,865,209 and Mex. \$27,529,807, or a total of Mex. \$61,495,016. At this time it is hard to conceive where this amount of money was ploughed into the above property. With the enhancement of value of water-front property at Woosung, Markham Road, and other places it is believed that in a short time physical valuation of the property would not be considered too high.

While the operating Expenses to Operating Revenue on the Nanking-Shanghai for the year 1928 is slightly over 62 per cent., it is important to point out that approximately 23 per cent. of the 1928 operating revenue represents interest on outstanding obligations for the above railways.

Seventy per cent. of the above interest could be saved on these railways, based on 1928 figures, with efficient management and supervising staff, which can be brought about by re-organization. In making this approximate estimate, personnel equation of the working staff was carefully considered.

The saving in expenses that should be effected are as follows :—

Fuel, N-S.R.	\$495,896	
S-H-N-R.	183,661	679,556
Overstaffing of different Departments	}	N-S.R.	675,229	
		S-H-N-R.	379,452	1,054,681
Improper Purchase of Sleepers				46,514
Excess Ballast Used				21,250
			Total	\$1,802,001

A Summary of the Report of the Shanghai Customs 2 1/2 % Surtax Treasury Notes Sinking Fund Commission

May, 1927—December, 1929

FROM May, 1927, the time of its organization, to the end of 1928 the Shanghai Customs 2 1/2 per cent. Surtax Treasury Notes Sinking Fund Commission had in its custody the sinking funds for the following five issues of the Chinese National Government notes and bonds :

1. First Issue, Shanghai Customs 2 1/2 per cent. Surtax Treasury Notes
2. Second Issue, Shanghai Customs 2 1/2 per cent. Surtax Treasury Notes
3. Rolled Tobacco Tax Treasury Notes
4. Rehabilitation Short-term Bonds
5. Seventeenth Year Short-term Currency Bonds (1928)

A comprehensive report on the working of the Commission was made for the information of the public at the end of 1928.

There are six other issues of the government notes and bonds the sinking funds of which have also been entrusted to the care of the Commission since 1929. They are :

6. Seventeenth Year Long-term Currency Bonds (1928)
7. Eighteenth Year Famine Relief Loan (1929)
8. Eighteenth Year Troop Disbandment Loan (1929)
9. Second Issue, Rolled Tobacco Tax Treasury Notes
10. Eighteenth Year Customs Revenue Treasury Notes (1929)
11. Eighteenth Year Troop Reorganization and Disbandment Loan (1929)

Up to the last day of 1929 the above mentioned 11 issues were served as follows :—

1. Redemption completed by 30 payments of principal and interest on the First Issue of the Shanghai Customs 2 1/2 per cent. Surtax Treasury Notes
2. 24 payments of interest made on the Second Issue of the Shanghai Customs 2 1/2 per cent. Surtax Treasury Notes
3. 21 payments of principal and interest made on the First Issue of the Rolled Tobacco Tax Treasury Notes
4. 3 payments of principal by drawings and 3 payments of interest made on the Rehabilitation Short-term Bonds
5. 2 payments of principal by drawings and 2 payments of interest made on the 17th Year Short-term Currency Bonds

6. 2 payments of interest made on the 17th Year Long-Term Currency Bonds
7. 2 payments of principal by drawings and 2 payments of interest made on the 18th Year Famine Relief Loan
8. 2 payments of principal by drawings and 2 payments of interest made on the 18th Year Troop Disbandment Loan
9. 9 payments of principal and interest made on the Second Issue of the Rolled Tobacco Tax Treasury Notes
10. 7 payments of principal and interest made on the 18th Year Customs Revenue Treasury Notes
11. 4 payments of principal and interest made on the 18th Year Troop Reorganization and Disbandment Loan

For the information of the public, the terms of the foregoing government loans as well as the receipts and disbursements of their sinking funds are given in the two tables attached hereto.

SUMMARY OF RECEIPTS AND DISBURSEMENTS OF SINKING FUNDS ENTRUSTED TO THE COMMISSION UP TO DECEMBER THIRTY-FIRST, NINETEEN HUNDRED AND TWENTY NINE.

Issue	Sinking Fund Received	Principal and Interest Paid	Balance
	\$	\$	\$
1st Issue, Shanghai Customs 2 1/2 % Surtax Treasury Notes	35,455,000.00	33,255,000.00	2,200,000.00
2nd Issue, Shanghai Customs 2 1/2 % Surtax Treasury Notes	7,296,000.00	7,296,000.00	—
1st and 2nd Issues, Rolled Tobacco Tax Treasury Notes	20,779,164.55	17,943,760.00	2,835,404.55
Rehabilitation Short-term Bonds	12,648,484.43	12,068,000.00	580,484.43
17th Year Short-term Currency Bonds (1928)	6,067,813.01	4,464,000.00	1,603,813.01
17th Year Long-term Currency Bonds (1928)	1,406,250.00	1,125,000.00	281,250.00
18th Year Famine Relief Loan (1929)	1,380,000.00	1,380,000.00	—
18th Year Troop Disbandment Loan (1929)	6,666,666.67	2,500,000.00	4,166,666.67
18th Year Customs Revenue Treasury Notes (1929)	5,600,000.00	5,600,000.00	—
18th Year Troop Reorganization and Disbandment Loan (1929)	4,730,600.00	4,730,600.00	—

Description of the Chinese Government Notes and Bonds, the Sinking Funds of which have been in the Custody of the Commission, Dec. 31, 1929

Issue	Total Amount of Issue	Date of Issue	Issue Price	Interest Rate	Date of Interest Payment	Redemption	Designated Securities	Denom-inations	Total of Principal and Interest	Total of Principal and interest already paid
First Issue, Shanghai Customs 2½ % Surtax Treasury Notes	\$30,000,000	May 1, 1927.	100	0.7 % per mensem (8.4 % per annum)	Last day of every month	Monthly payment of interest and one thirtieth of principal since July, 1927. Redemption to be completed on December 31, 1929.	Increased collections of Customs.	\$10,000 \$1,000 \$100 \$10	\$33,255,000	\$33,255,000
Second Issue, Shanghai Customs 2½ % Surtax Treasury Notes	\$40,000,000	October 1, 1927.	98	0.8 % per mensem (9.6 % per annum)	Last day of every month	Only interest paid from January, 1928 to December, 1929. Monthly payment of interest and one fortieth of principal from January, 1930. redemption to be completed on April 30, 1933.	Increased collections of customs.	\$10,000 \$1,000 \$100 \$10	\$54,240,000	\$7,296,000
First Issue, Rolled Tobacco Tax Treasury Notes	\$16,000,000	April 1, 1928.	98	0.8 % per mensem (9.6 % per annum)	Last day of every month	Monthly payment of interest and one thirty-second of principal since April, 1928, redemption to be completed on November 30, 1930.	Entire rolled tobacco tax.	\$10,000 \$1,000 \$100 \$10	\$18,112,000	\$12,034,000
Rehabilitation Short-term Bonds	\$40,000,000	\$20,000,000 on June 1, 1928. \$20,000,000 (\$2,000,000 withdrawn) on December 31, 1928.	First Series at 92 to 94 Second Series at 96	8 % per annum	June 30 and December 31	Redemption in ten equal installments by semi-annual drawings since date of issue, to be completed on June 30, 1933.	Increased collections of customs.	\$10,000 \$1,000 \$100 \$10	\$44,480,000	\$12,068,000
Seventeenth year Short-term Currency Bonds (1928)	\$30,000,000	October 1, 1928.	92	8 % per annum	March 31 and September 30	Semi-annual drawings redeeming 7 % yearly in first 3 years from date of issue, 20 % yearly in second 3 years, and 19 % in seventh year, redemption to be completed on September 30, 1935.	Surplus from cancelled German Indemnity after meeting requirements of Fourteenth Year National Loan and Continental Bank Loan.	\$10,000 \$1,000 \$100	\$40,812,000	\$4,464,000
Seventeenth Year Long-term Currency Bonds (1928)	\$45,000,000	November 1, 1928.	100	2½ % per annum	March 31 and September 30	From date of issue to September 30, 1933, only interest will be paid. Redemption will begin thereafter by semi-annual drawings of \$1,125,000 each, to be completed on September 30, 1953.	Customs surplus.	\$10,000 \$1,000 \$100 \$10	\$62,156,250	\$1,125,000
Eighteenth Year Famine Relief Loan (1929)	\$10,000,000	January 1, 1929.	98	8 % per annum	June 30 and December 31	Redemption to be completed on December 31, 1938 by semi-annual drawings from date of issue, each to redeem one-twentieth of the loan.	Increased collections of customs.	\$10,000 \$1,000 \$100 \$10 \$5	\$14,200,000	\$1,380,000
Eighteenth Year Troop Disbandment Loan (1929)	\$50,000,000	February 1, 1929.	98	8 % per annum	January 31 and July 31	Redemption to be completed on January 31, 1939 by semi-annual drawings from 1929, each to redeem one twentieth of the loan.	Increased collections of customs.	\$10,000 \$1,000 \$100 \$10 \$5	\$71,000,000	\$2,500,000
Second Issue, Rolled Tobacco Tax Treasury Notes	\$24,000,000	March 1, 1929.	98	0.8 % per mensem (9.6 % per annum)	Last day of every month	Redemption to be completed in January, 1932, by monthly repayment of 2 % of principal from April, 1929 to March, 1930 ; 2.5 % from April to November, 1930, and 4 % thereafter.	Secured from date of issue to November 30, 1930 by surplus from sinking fund for First Issue of Rolled Tobacco Tax Treasury Notes, and, from December, 1930, also by said sinking fund as released by complete redemption of First Issue. In addition, customs surplus will be appropriated to cover any deficit in sinking fund required.	\$10,000 \$1,000 \$100 \$10	\$27,889,920	\$5,909,760
Eighteenth Year Customs Revenue Treasury Notes (1929)	\$40,000,000	June 1, 1929.	98	0.7 % per mensem (8.4 % per annum)	Last day of every month	Monthly principal and interest payment of \$800,000 from June, 1929. Redemption to be completed in July, 1934.	Increased collections of customs.	\$10,000 \$1,000 \$100 \$10	\$49,404,961.12	\$5,600,000
Eighteenth Year Troop Reorganization and Disbandment Treasury Notes (1929)	\$70,000,000	September 1, 1929.	98	0.7 % per mensem (8.4 % per annum)	Last day of every month	Monthly payment of interest and 1/100 of principal from September, 1929, redemption to be completed on December 31, 1937.	Increased collections of customs.	\$1,000 \$100 \$10	\$94,745,000	\$4,730,600

The Air Mail Problem in China

It is not at all improbable that because of the heavy cost of building and equipping new railways and because of the time it will take to construct the lines, aviation, in China, will have to be the forerunner of the railway. In opening vast areas to modern means of communication. This was undoubtedly the plan of Mr. Sun Fo, when he became the President of the China National Aviation Corporation, while concurrently serving as Minister of Railways. It was his hope and intention effectively to combine the two services in such a way that they supplemented and served each other. The agreement between the Curtiss group in the United States and the China National Aviation Corporation was looked upon as a forerunner of a series of such agreements, not only with this group but with others; not only with Americans but with aviation companies of other countries. A similar agreement was actually signed with the German Luft Hansa.

From the very beginning of this enterprise, an administrative difference of opinion developed between the Ministry of Railways and the Ministry of Communication. The latter Ministry felt that aviation was within its sphere of activities and the organization of the China National Aviation Corporation with the Minister of Railways as its President was a usurpation of its functions. That was, of course, a question to be determined by the State Council, which supervises the work of the Ministries in accordance with the present form of government in China. After more than a year of discussion, it was finally decided that the Minister of Communications was to become President of the China National Aviation Corporation. With this legal and constitutional question, no outside person is concerned: the State Council has the right to select any President it desires. But a change of President in no way invalidates a contract made with the Government.

The aviation question then arouses interest in two points: first, the inviolability of contracts, secondly, the question of national credit.

Inviolability of contract becomes increasingly important as the National Government extends its commercial activities. It is now engaged in operating railways, air mail lines, steamships, electric light plants, and other public utilities. None of these enterprises need be affected by political changes any more than a private business need be so affected. If there is to be continuity of operation, if the commercial enterprises of the government are to be managed efficiently and are to be safeguarded by adequate credit for materials to be purchased and obligations to be undertaken, then the government must make its signature to a contract absolutely irrevocable except under the terms specified in the contract. In a word—business is business and when the Government participates in business, it must do so along the soundest possible lines. It must assume full responsibility for the acts of its agents, even as any business would.

There has usually been criticism of Government participation of business enterprises because of the inability of public officials to differentiate between business as business and their own political connections and purposes. In most places, government participation in business has not been altogether successful because of a lack of application of business methods. However, one need not consider the general question of government participation in business beyond the fact that if the National Government of China enters upon business enterprises, business principles must govern.

The question of national credit looms large in any breach of contract. But this question must be dealt with as an entirety and not piecemeal. It is to be presumed that the Kemmerer Commission has studied this problem and that they have made a recommendation to the Minister of Finance on the subject. It would seem that there is a danger to Nanking in diffusion of authority with regard to this question of National credit. It would seem as though the apparent failure of this contract would impel the Government to make it a fundamental principle that the National debt



Mr. Sun Fo, Former President



Mr. Wong Po-chun, Newly Appointed President

China National Aviation Corporation

of China cannot be increased and the national credit affected without the sanction of the Ministry of Finance :

Mr. Price's letter follows :

CHINA AIRWAYS FEDERAL INC. U.S.A.

Operators For

CHINA NATIONAL AVIATION CORPORATION.

3 Canton Road

Shanghai, China.

January 24, 1930.

Their Excellencies,

The President and Members of the State Council,
Republic of China.

Excellencies :

We have the honor to place before Your Excellencies certain matters which Your Excellencies are entitled to know and, knowing, unquestionably would wish to consider and act upon. These matters concern two contracts executed on April 17, 1929, by His Excellency Sun Fo, as representing the Chinese Government in the capacity of President of the China National Aviation Corporation and ratified by the State Council on April 19, 1929.

Your Excellencies will recall that, early in 1929, the Chinese Government invited what was then known as the Curtiss-Keys group of aviation companies in the United States to send representatives to China to investigate the field of aviation in this country, and to consult with representatives of the Chinese Government on the possibility of co-operation between the Government and private American capital and technical experience, in the promotion of Chinese aviation in China.

Your Excellencies will recall that the American interests, working, for the purpose, through an organization known as Aviation Exploration Inc., sent as their representatives two eminently qualified gentlemen,—Major William B. Robertson, President of Aviation Exploration, Inc., and of the Curtiss-Robertson Aeroplane Manufacturing Company, and Commander Roland Riggs, legal counsel. On the side of the Chinese Government, a Government owned and controlled corporation was created, called the China National Aviation Corporation, to which was given full authority to control all civil aviation in China. His Excellency Sun Fo, a member of the State Council, was appointed President of the Corporation, and various other high officials in the Government were appointed members of the Board of Directors, including His Excellency, the Minister of Communications.

The two parties held conferences which extended over a period of several weeks. We understand that various high officials of the Government, including His Excellency, the Minister of Communications, participated in these conferences. The discussions were frank and exhaustive, both sides being anxious to arrive at an arrangement which would permit American capital and experience to assist the Chinese Government in the development of Chinese civil aviation on a basis just and advantageous to both sides.

The net result was the execution of two contracts. One of these, called the Air Mail Contract, provided for the establishment and maintenance of three air routes in China, for the carrying of the air mail, passengers and freight. The other was called the Commercial Contract, and provided for the establishment of aviation schools, factories and other phases of the aeronautical industry.

The contracts were signed by Mr. Sun Fo on April 17, 1929, and were ratified by the State Council on April 19, 1929. They were then published in full in the press of China.*

Under these circumstances, it would appear obvious that the American interests concerned had every reason to believe that this effort at co-operation between, on the one side, American capital and experience, and on the other side, the Chinese Government, was welcomed by both Government and people ; that the contracts as finally executed had the deliberate and authoritative approval of the Government ; and that, so far as was humanly possible, the public had been taken into the confidence of the Government and had been given every opportunity to express itself on the subject.

Before proceeding further, it might be well here to summarize just what the American interests concerned offered and agreed to do under these contracts, and on what terms. They agreed, first of all, to provide the necessary capital to start and maintain operation for a period of ten years of three air mail, passenger and express

routes, covering over 3,000 miles, and connecting most of the important cities in the country. They agreed to provide, for these services, the best and most up-to-date aviation equipment produced in the United States, and the services of experienced air transport pilots and mechanics. They agreed to establish aviation schools, to train and to use, when available, Chinese pilots and mechanics ; and to assist in the establishment of factories in China for the manufacture of aeroplanes and equipment. The terms of compensation to the American operators agreed to under the Air Mail Contract were just and reasonable, being in fact less than the compensation actually being paid by the United States, Canadian, Mexican and other Governments for similar services. But what is more important, as showing the readiness of the American interests to co-operate in the undertaking, they agreed to take as the immediate cash part of their compensation only such money as the Government actually received from the public in the form of purchases of air mail postage and passenger and express fares, any balance to be paid in long term notes, secured on the air mail receipts themselves, up to an amount of G.\$2,000,000.

On its part, the Chinese Government agreed, among the essential things, to give the American Company "the exclusive right to carry all air mail on the routes specified" in the contract. The Chinese Government agreed "to furnish, equip, police, maintain, and have ready for operation adequate airports at the above named cities, and adequate intermediate landing fields at intervals of not more than 100 miles." It agreed, "until such time as the postal receipts for air mail should equal or exceed the amount of compensation due," to pay over the air mail receipts, calculated on a specified basis, and the receipts from passenger fares and express charges ; and to give notes for the balance. It agreed to grant entry free of duty for the equipment and materials used, and to give protection to the personnel and equipment of the American Company.

A contract more generous to the Chinese Government it would be difficult to imagine. What the American interests offered, in effect, was to finance, establish and operate 3,000 miles of airways in China, which would cost the Chinese Government, outside of the providing of the necessary air fields, not one cent in cash, and which there is every reason to believe would, within the life of the contract, not only pay back the notes but make a handsome profit to the Government, besides.

It was, of course, obvious that the success of such a contract was predicated on the good faith and whole-hearted and continued co-operation of the Chinese Government. It was an undertaking of no small magnitude to agree to make an investment which, before it was completed, would amount to some G.\$5,000,000 in personnel, aeroplanes, radio equipment, hangars, repair shops, and all the paraphernalia, etc., of such an enterprise, and place this investment in China. Naturally, the American interests had every right to expect that, in case the Chinese Government should discover any reason why the contract should not be proceeded with, the Government would call a halt before any investment had been made.

The fact remains, that not only were no objections raised during that six months during which preparations were under way, but also the Government, through its authorized representative, the China National Aviation Corporation, urged the American interests to speed their work of preparation in order that the service could be started on time. This they did. The operating company was formed ; the personnel and equipment brought out ; and by October 17, 1929, the date set by contract for the commencement of the service, China Airways was ready to operate.

And permit us to record, at this point, that, from that date to the present, China Airways has faithfully performed all of its obligations under the contracts.

China Airways has been carrying the air mail and passengers turned over to it by the China National Aviation Corporation, regularly. To get this service started on one line and to operate it three months China Airways has spent to date over G.\$500,000. It has taken from other positions in the United States and Canada and brought to China a trained personnel numbering twenty-five persons, and added to that personnel a considerable number of Chinese and others locally employed. It has in operation five of the latest type amphibian planes, and a complete system of radio equipment. It has several other planes on hand, and a very large

*Far Eastern Review, May, 1929.

investment in spare parts and repair equipment. It has indicated its readiness to proceed with the establishment of the other two routes called for in the contract, just as soon as the Government has provided the necessary airports and intermediate landing fields.

Unfortunately, there must now be recorded those facts which make necessary the writing of this letter. With certain noteworthy exceptions, which will be hereinafter specifically mentioned, China Airways, since the inauguration of the service three months ago, has, to its surprise and deep disappointment, encountered not only non-co-operation, but also persistent breaches of contract and active opposition, on the part of the very agency of the Chinese Government charged with the duty of supporting and carrying out the contracts.

Permit us to make clear, at this point, that with His Excellency Sun Fo and those other gentlemen who, under his direction as President, composed the staff of the China National Aviation Corporation, during the six months prior and the first six weeks subsequent to the commencement of operations, our relations were most cordial. Our Company felt and still feels that Mr. Sun Fo did everything within his power to co-operate with us and to carry out the terms of the contracts.

With the decision of the Chinese Government to change the personnel of the agency charged by the Government with the duty of carrying out its obligations under our contracts, we have, of course, no concern. We had, however, every right to expect that the new personnel would carry out the obligations with equal sincerity and fidelity and would work with us to make of the undertaking a success. Unfortunately, the facts of the case are as given below, constituting a situation which obviously cannot continue in justice either to the Chinese Government or to us. For the sake of greater clarity we shall divide these facts into two headings,—those which constitute breaches or non-fulfillment of contract; and those which indicate non-co-operation or actual opposition.

BREACHES OR NON-FULFILLMENT OF CONTRACT

1. Failure to Provide Airports and Landing Fields.

Article 2, Section 2, of the Air Mail Contract, provides:

"The Chinese Corporation agrees to furnish, equip, police, maintain, and have ready for operation adequate airports at the above named cities, and adequate intermediate landing fields at intervals of not more than 100 miles, within the specified six months period."

Up to the present, in spite of repeated requests from us, the China National Aviation Corporation has failed to provide us a single adequate landing field, on which we have authority to erect hangars or repair shops. Here is our present situation at each of the places at which our planes call on the Shanghai-Hankow Route:

- (a) At Lunghwa, outside Shanghai, the China National Aviation Corporation has provided for our temporary use a small piece of land, on which we have erected two small mat-shed hangars. As the China National Aviation Corporation has not provided us with a land field, we must use the Whangpoo River for taking off and landing, which is frequently inconvenient and sometimes dangerous at times when the River is full of ships and boats. Also, the mat-shed hangars are a fire hazard, and are inadequate to house our planes. At least one plane at a time must, under present conditions, be left out-of-doors. Finally, without a repair shop, we have no adequate facilities for effecting repairs. It is absolutely essential that at Shanghai, which is one of the terminals of our Shanghai-Hankow Line, we be furnished a suitable land field, as provided in the contract.
- (b) At Nanking we have been given verbal permission to use the military field near the Hsi Hua Men, but in spite of repeated requests from us, we have never been given formal written authority to use the field or to erect necessary buildings there.
- (c) At Kiukiang no landing field has been provided us.
- (d) At Hankow, where we have been given verbal permission to use the military field, the situation is the same as at Nanking except that Hankow is a terminus, and we should keep one plane there in reserve. Several times we have had to default on an east-bound flight, because the west-bound plane was unable to get through and we had no plane in reserve. At Hankow, it is absolutely essential that we be either provided a field of our own or else be given formal permission to use the military fields and authority to erect a permanent hangar on it, and that the field and road leading thereto be improved.

The present situation regarding lack of fields and space for hangars, shops and other buildings, simply cannot continue. We are not only subjecting our personnel and equipment to intolerable conditions, and running unnecessary risk of fire and accident, but also we are placed in a position where we sometimes must default

quite unnecessarily on flights, losing money thereby both for the Chinese Government and us, and injuring the good name of the service.

2. Failure to Recognize Exclusive Right to Carry Air Mail.

Article 20, Section 1 of the Air Mail Contract provides:

"The Chinese Corporation grants to the Company the exclusive right to carry air mail on the routes specified in the contract."

The Ministry of Communications, within three months of the ratification of our contract, commenced operation of an air mail line between Shanghai and Nanking, carrying both air mail and passengers. There have been repeated reports in the local press, which the Ministry of Communications has not denied, that the Ministry of Communications intends to extend this line to Hankow. All of this is over one of the routes provided for in our contract, the route which we are now operating.

The following "Post Office Mail Notice" is appearing in the Shanghai foreign newspapers:

"AIR MAIL.—Air Mail (Letters and Postcards) for or via Nanking, Kiukiang and Hankow per aeroplanes of the China National Corporation closes at 6.30 a.m. daily except Sunday. The 2nd Despatch for or via Nanking per aeroplanes of the Shanghai-Chengtu Air Service closes at 7.20 a.m. daily except Sunday and holiday."

If it be true, as the "Post Office Mail Notice" above indicates, that the Post Office is despatching air mail for Nanking by the competing line, this is a gross breach of our contract.

There are other phases of this matter besides the apparent breach of contract. Our desire to co-operate in the promotion of the success of this undertaking is evidenced by the fact that we pay several hundred dollars a month to advertise our service, which expense we are under no obligation under the contract to bear. The Ministry of Communications spends Government funds to advertise its service. We have been provided no air fields. The Ministry of Communications has been given the use of the Government fields at Shanghai and Nanking at both of which fields it has erected hangars.

3. Failure to Pay Total Air Mail Receipts.

Article 12, Section 2, provides:

"Until such time as the postal receipts for air mail shall equal or exceed the compensation paid the Company for this service under this contract, the Chinese Corporation shall pay to the Company in cash on or before the 15th of each month, the total postal air mail receipts for the preceding month."

As a matter of fact, the China National Aviation Corporation failed to pay us the October air mail receipts on the due date, November 15, and gave as its reason that it had been unable to obtain payment from the Post Office. When payment for October and November was finally made, on December 16, it was on the basis of fifteen cents per letter instead of nineteen cents per letter actually collected. This we consider a violation of the contract which specifically states that we are to receive "the total postal air mail receipts." The contract does not state a portion of the air mail receipts, nor does it state only that portion covered by an air mail stamp but the total postal air mail receipts, calculated as provided in the contract.

We must insist that this provision of the contract be met. It is only just that when we are carrying the whole load of this enterprise, and spending large sums of money to operate this service until it begins to pay for itself, we should at least receive from the Government what the Government receives from the public using the air mail.

4. Failure to Pay Air Mail Receipts According to Contract.

Article 12, Section 3 provides:

"For the purpose of this contract, the air mail receipts shall be calculated by multiplying the number of pounds of air mail carried by the Company by 40 (as the average number of letters per pound), and this multiplied by the air mail rate per letter."

"Pounds of air mail carried" is the total weight we carry. This is the practice in other countries. For the month of December, the China National Aviation Corporation, in calculating the cash payment due us, deducted 817 pounds from the total of 5,451 pounds which the Post Office receipts given us show we actually carried, and for which we were entitled to cash compensation. This is a violation of the contract and contrary to international practice.

Hence we must insist that we be paid, as the contract provides.

5. *Refusal to Provide Mail and Passengers for Sunday Flying.*

Article 6, Section 1 provides:

"It is understood that the schedule of this service is to comprise at least one airplane on each route in each direction per day, including Sundays and other public holidays."

At the outset, while the service was just getting organized, we agreed with His Excellency Sun Fo, the former President of the China National Aviation Corporation, that we would postpone Sunday flying for a few weeks. Later it was agreed to commence Sunday flying January 1, 1930. We gave formal advance notice thereof to the China National Aviation Corporation and the public, and have actually flown daily including Sundays since January 1. To our surprise we find that the China National Aviation Corporation is refusing to sell passenger tickets or deliver mail to the planes on Sunday. This is not only a flagrant violation of the contract, but also deprives both the Chinese Government and our Company of considerable cash revenue, for the planes are flying empty.

We must insist that this violation of the contract be rectified. It might here be mentioned that regularity is the very essence of success in a public service such as this. An air mail service must endeavor to be as regular as the Post Office itself, or as a railroad or steamship line.

Serious as have been, from our point of view, the specific breaches of contract above noted, equally serious have been the evidences of unwillingness of the part of the agency of the Chinese Government charged with the duty of carrying out the contract, to co operate with us. Even more serious have been the evidences which have appeared of actual opposition to us and to our undertaking.

When His Excellency Sun Fo resigned the Presidency of the China National Aviation Corporation, and was succeeded by His Excellency, Wang Po-chun, we looked forward to a continuation of the happy relations previously subsisting. The President of our Company made haste to call on the new President at once. In his interview with His Excellency on December 13, 1929, at Nanking, he expressed the felicitations of himself and the Company he represented, and their earnest desire to work in fullest co operation with His Excellency in the furtherance of their mutual undertaking. In this brief interview, His Excellency, without going into details, stated that he had not approved and did not approve our contracts.

Subsequently, there having appeared in the newspapers items purporting to be reports of interviews with His Excellency, in which Minister Wang was reported as having expressed strong disapproval of our contracts, our President made an effort again to see His Excellency in order to attempt to rectify any misunderstandings. Being unsuccessful in this effort, we prepared for His Excellency a written statement entitled "Story of China Airways" and sent it to him. In our covering letter, we expressed the hope that His Excellency might find the time to receive our President personally to talk over the situation. The Minister replied stating that he was still engaged in a study of the future of the China National Aviation Corporation, and that, on completion of his study, he would make an appointment to see our President.

Meanwhile, attacks on our contract in the press, purporting to come from His Excellency, continue.

At the same time, we have found it very difficult to deal with the subordinate staff of the China National Aviation Corporation either here or in Nanking, for the reason that these gentlemen state that they are under specific orders, in what they do, and have no authority to deal with us on matters touching the carrying out of our contract. For example, on the matter of Sunday flying, they state they are under specific orders not to sell tickets or to accept mail for delivery to Sunday planes, and have nothing to do but obey those orders. Furthermore, letters from us to the China National Aviation Corporation, some of them of very considerable importance, remain unanswered.

As we are unable to get in touch with the President of the China National Aviation Corporation, and as the subordinate members of the staff of the China National Aviation Corporation say they have no authority to deal with us, the situation leaves no alternative but to appeal directly to Your Excellencies who compose the State Council which ratified our contracts.

We trust Your Excellencies will feel assured that our Company stands always ready to enter into any discussions that may be desirable with respect to our mutual undertaking. If, in the light of experience in the actual operation of the service, there have

developed points which the Chinese Government feels might well be changed in the contracts, we are at all times ready to discuss them. We are sure Your Excellencies will agree, however, that the present situation cannot continue, and that our New York office is justified in having now adopted the position that it cannot consider further capital investment or even the continuance of the present line unless these outstanding questions are settled.

The case presented to Your Excellencies by the facts here given in detail is one of a clear breach, which in places has appeared intentional on the part of the China National Aviation Corporation, of a contract entered into by it on behalf of the Chinese Government which "guaranteed its faithful execution," and we are not yet ready to believe that the Chinese Government will passively countenance this violation and disregard of its contractual obligations.

We avail ourselves of this opportunity to extend to Your Excellencies the assurances of our highest respect.

CHINA AIRWAYS FEDERAL INC. U.S.A.
ERNEST B. PRICE, *President.*

P. S. Hopkins Head of American and Foreign Power Company Interests in China

It was announced that effective March 1, 1930, P. S. Hopkins is resigning his position as General Manager of the Standard Oil Company of New York (North China Department) to take charge of the interests of the American and Foreign Power Company, whose subsidiary, the Shanghai Power Company, acquired,



P. S. Hopkins

last year, the Municipal Electricity Department of Shanghai. While a comparatively young man, Mr. Hopkins has had a long and distinguished career in China. He was born in Peking, China, a son of N. S. Hopkins, M.D., of Boston, Mass., and lived in China for the first fifteen years of his life. He was educated in the United States,

(Continued on page 79).

Maurice A. Oudin 1866-1929

ONE of the pioneer leaders in the expansion of America's foreign trade has passed away. Mr. M. A. Oudin, senior vice president of the International General Electric Company died on December 4th, at his home in Schenectady after a brief illness, leaving a wide circle of friends in all parts of the world, who will miss his cheerful presence in the offices of his company and his intelligent advice on vital questions of international importance. For twenty five years his guiding hand and brilliant mind directed the overseas activities of America's greatest electrical corporation, building up the business from the comparative obscurity of the foreign department of the parent company to its present proud and independent position as an international force in the expansion of American interests. The I.G.E. has grown under Mr. Oudin's direction until it now has branch offices in thirty four foreign countries. Mr. Oudin from the start of his career was keenly interested in the electrical development of the Far East and it was due largely to his grasp of the possibilities of this field that the General Electric Company became definitely connected with the industrial growth of Japan and China, through the financial co-operation of his company with the Mitsui and other Japanese interests in the expansion of the Shibaura Engineering Works and the Tokyo Electric Company into the foremost electrical manufacturing concerns in Japan and the establishment of the China General Edison Company in Shanghai. In recognition of his splendid services to the modernization of old Japan through the creation of basic electrical manufacturing plants and the development of its power resources, Mr. Oudin was decorated in 1911 by the Emperor of Japan with the Order of the Rising Sun. It is no detracting from the splendid work of other foreign electrical engineers and manufacturers who have contributed to transforming Japan into a modern industrial nation, to recognize and praise the pioneer work carried out by the General Electric Company, under the direction of Mr. Oudin.

Although he was primarily interested in the work of his company in Japan and the success of its investments, Mr. Oudin also had great faith in the future of China. By his death, China has lost one of her best friends in the United States. Although Mr. Oudin was a prominent member of the Japan Society, he was also vice-president of the China Society where his uncompromising championship of her cause, did much to swing American sympathy in China's favor.

A brief sketch of his career follows:

Mr. Oudin was son of the late Professor Lucien Oudin and Sophie Josephine (Agnus) Oudin. He was born March 31, 1866, in New York City. After preparatory education in the public schools of New York, he was graduated in 1885 with the degree of A.B. from the College of the City of New York, and afterwards entered Princeton University from which he was graduated in 1891 with the degrees of E.E. and M.S.

In 1891 he joined the Thomson-Houston Electric Company, Lynn, Massachusetts, and continued in various capacities with its successor, the General Electric Company at Schenectady. He was active in their power and mining interests and also served for a time as acting district manager of the Denver territory. At this period he wrote his book *Standard Polyphase Apparatus and Systems*, which enjoyed a wide and favorable reception, resulting in successive editions.

On his return to Schenectady he was chosen to consolidate and extend the engineering work of what was then the Foreign Department of the General Electric Company. With this accomplished, he was put in general charge of the Company's export interests and relations, being made manager of the Foreign Department in 1904. In this capacity he traveled extensively in Russia, China and Japan, forming new connections.

In 1919, the International General Electric Company was formed to take over all the activities of the parent company with relation to foreign business, and Mr. Oudin was appointed its first vice president.

With a background of long experience in foreign business Mr. Oudin was a recognized authority on the subject of international trade and economics. A pioneer in the forward movement of the foreign trade of the United States he early recognized and pointed out that a constantly increasing outlet for the country's products was essential to the stabilizing of domestic industries. He had been instrumental in advancing the technical and foreign interests of the country and served on the Advisory Committee of the Far East, appointed by Herbert Hoover while Secretary of Commerce.

In 1911, Mr. Oudin was decorated by the Emperor of Japan with the Order of the Rising Sun, and in 1928, was decorated by the King of Italy with the Order of Commander of the Crown of Italy.

Mr. Oudin was a member of the American Institute of Electrical Engineers. He was a member, and one of the organizers of the National Foreign Trade Council; a member and past governor of India House, which he also

helped to found; member and past vice president of the China Society; president of the board of trustees of the Italy-America Society; member of the Japan Society and of the Asiatic Association.

Mr. Oudin was married December 31, 1895, to Susan Worth Folger of Geneva, New York, daughter of the late Charles J. Folger, Secretary of the Treasury, under President Arthur and Chief Justice of the Court of Appeals, New York. Their children are Charles Folger Oudin, and Jane F. Oudin. An elder daughter, Susan Constance Oudin, was married to the Marchese Leopoldo di Targiani of Rome, Italy, and died April 27, 1928, at Luzerne, Switzerland.

A man of broad human sympathies, Mr. Oudin established lasting friendships at home and abroad. The value of his counsel went beyond a grasp of impersonal facts and figures, it was enhanced by an intuitive understanding of peoples, a knowledge of their traditions and respect for their ideals and aspirations.



Maurice A. Oudin, Late Senior Vice-President, International General Electric Company, Inc.

Book Notes

China and Japan

The International Relations of Manchuria by C. Walter Young, published for the American Council, the Institute of Pacific Relations, by the University of Chicago Press, Chicago, 1929.

The Nationalist Program for China by Chao-Chu Wu, Yale University Press, New Haven, 1929.

Foreign Languages in Japan by Dr. Mazo Nitobe, The Osaka Mainichi and the Tokyo Nichi Nichi, 1929.

It is difficult to find three books so very different from each other; Dr. Young has attempted an encyclopaedia Manchuria, Dr. Wu has restated the Kuomintang credo with particular emphasis on international relations, Dr. Nitobe has inscribed a history of Japan's debt to foreign cultures; but the three volumes unite on a single phase of numerous intricate problems: they discuss the relations between Japan and China—Dr. Young with studied impartiality, Dr. Wu with the legally-trained mind of a special pleader, Dr. Nitobe with the humanistic love of broad cultures intermingling in the realm of language.

Dr. Young's "The International Relations of Manchuria" is not an interpretive but an analytical effort. In fact, the author seeks to add a highly specialized chapter to Mr. MacMurray's collection of treaties, agreements, etc. From the standpoint of pure scholarship, then, this is a very useful addition to the literature on Manchuria—not as absorbing as Dr. Clyde's or Dr. Joseph's studies—but definitely more complete and indicative of a first hand rather than an exclusively book knowledge of the problem. Dr. Young's discussion of the railroad situation in Manchuria is the most thorough survey of the subject yet presented to the public.

In my opinion, Dr. Young lays too little emphasis on the Li-Lobanoff Treaty, which has now become the key treaty of the Manchurian situation. When one considers the amount of space and effort Dr. Young devotes to the futile Knox neutralization plan, it is difficult to understand what was wrong with Dr. Young's sense of proportion in his handling of the Li-Lobanoff Treaty. This becomes particularly significant in view of Mr. Matsuoka's speech before the Pacific Relations Conference in which he said:

The Chinese delegates at the Washington Conference were called upon to produce the text of this Secret Alliance Treaty. China registered at the Conference only a synopsis of it and promised to produce the full text later on. But somehow, I believe I am correct, China has failed to this day to carry out that promise. However, we have it in MacMurray's compilation of China Treaties and Agreements; the full text was also published by the Soviet Government. Japan had no inkling of this Secret Alliance Pact during the Russo-Japanese War, and felt truly sorry that she had to fight it out with Russia in the territory belonging to neutral China. If it could have been fought out somewhere outside of Chinese territory, Japan would certainly have been too glad to do so. As it was, Japan met Russia face to face in Manchuria and battled it out there, entertaining throughout the war a real feeling of regret and sympathy for China, and Komura, in negotiating with China at Peking upon conclusion of the war, was swayed with this sentiment even to the point of trying to make up to China, for the hardships unavoidably entailed upon the populace of Manchuria in the course of war.

My friends, suppose Japan had known, during the war or right upon its conclusion, the existence of this secret alliance treaty, what do you think, the result would have been? Knowing, as we do, the world temper or atmosphere in those days, I am afraid, Japan would have certainly had taken the whole of South Manchuria and no nation would have said a word about it. And we would not have had the Manchurian Question to discuss at this Conference to-day.

To this speech, one adds, as confirmatory evidence of the importance of this treaty, the events in Manchuria concerning the Chinese Eastern Railway during 1929.

Dr. Young's introductory chapter on "The Sino-Russian Crisis of 1929 over the Chinese Eastern Railway" must have been a hurried interpolation which is unfortunately spoiled by too concise a summarization of the documents.

Dr. Young throughout maintains an unusual impartiality, except that he over emphasizes the importance of American efforts and he calls the Soviet Government in numerous places the "Trotsky Lenin Government in Russia," which is neither scholarly nor facetitious.

Dr. C. C. Wu's "The Nationalist Program for China" consists of a two lectures delivered at the Williamstown Institute with Dr. Wu's discussion of the Manchurian question and a number of appendices dealing principally with China's foreign policy. The best and most important chapter is the first, which is an

unusually lucid and significant discussion of "The Domestic Program of the Kuomintang." Unlike many of China's representatives in foreign countries, Dr. Wu knows China and has been a Kuomintang leader. In fact, during one short moment in the history of the Kuomintang, he was the salient personality whose political activity supported the continuity of the party as the Nanking Government. As Minister of Foreign Affairs, he served his party and Government during the most trying period since the Boxer Rebellion—immediately after the Nanking Outrage. This chapter then on "The Domestic Program of the Kuomintang," is then written by one who knows and understands the program because he has helped to mould it.

Dr. Wu falls into an error, so usual with Chinese, of assuming that anarchy, even the most orderly anarchy, is democracy. Democracy implies a form of representative government and that China has never had, except during the abortive attempts to establish a parliament subsequent to the 1911 revolution. I do not desire to suggest that, for China, democracy is more suitable than the form of passive anarchy to which the Chinese are accustomed and which seems to be the particular expression of their political genius, but I call attention to this difference, because even when speaking in the United States, one should be strictly accurate. A passive anarchy—a clan and village anarchy under a *pater familias* is not democracy. So when Dr. Wu discusses the Period of Tutelage, he grows too anxious about the movement in the direction of Democracy. The Period of Tutelage seems to be as suitable for China as democracy and it is difficult for the student of political forms in China to believe that democracy—that is, representative government—is at all necessary for or adaptable to China. There is, after all, no reason why a Parliament should be useful in China—the fact that it exists in Great Britain and the United States proves absolutely nothing in China.

Dr. Wu's discussion of the single-tax land system is interesting and important and may work in China although single-tax has not been successful in any modern, industrialized country. Dr. Wu expects this tax to discourage excessive investment in land and therefore to free capital for industrial enterprises. But capital is invested in land because there is, after all, a large degree of security in landownership which does not exist in industrial investments because no Chinese Government has thus far been able to provide security and protection to indigenous capital. As I write this, the fact has become public that the Nanyang Brothers Tobacco Company, the largest single Chinese industrial concern, has gone to the wall—mismanagement, lack of security, lack of protection, labor troubles, etc.

Dr. Wu's discussion of the Kuomintang domestic policy gives an exceedingly hopeful and optimistic view of the efforts of the party and by and large optimism is justified by the mere fact that perceptible advances are being made in the internal affairs of China. In his lecture on "The Foreign Program of the Kuomintang" and in the discussion of Manchurian problems, Dr. Wu presents an unabashed picture of the Kuomintang foreign policy which has been a continuing one from 1927 when Dr. C. C. Wu became Minister of Foreign Affairs of the newly founded Nanking Government or even longer, for basically the program was laid down by Dr. Sun Yat-sen, the founder and philosopher of the Kuomintang.

The underlying question naturally is why the Nationalists emphasize the international rather than the internal problems of China. Dr. Wu replies to this question by a general assumption that all of China's difficulties arise from her international position. He says:

Whatever the experience of other nations may have been, with us, the internal problem of reform and the external problem of the treaties are intertwined; they are really two aspects of one question. The present rights and privileges of foreigners in China are so ramified that they go into practically every nook and corner, every phase and aspect, of our national life, so that wherever we wish to make any internal change, even a change for the better, we encounter at every point the foreigner ensconced behind his treaties.

Now most foreigners will disagree with this interpretation of the situation. They would say that the so-called unequal treaties hardly affect the general condition of China, that floods, drought, civil war, improper fiscal arrangements, exorbitant and illegal taxation and other abuses of power by the militarists are the causes of China's present disturbed conditions. But it is important to note, that the statement of China's case as presented by Dr. Wu

is what most Chinese believe to be true and that therefore it is of particular value to have it so clearly and vigorously stated. Dr. Wu's emphasis on the Turkish example is a little wide of the mark, for before Turkey was able to get rid of the capitulations, she got rid of most of the Turkish Empire. Egypt, Syria, Palestine, Arabia, Mesopotamia, Turkey in Europe went first—then the capitulations. A tiny Turkey was able to achieve what no larger Turkey could have done, for after the Powers had possessed themselves of the richest countries of the old Turkish Empire, there was nothing to quarrel about. A correct analogy would be the partition of China leaving only the province of Kiangsu with a capital at Nanking and the port of Shanghai.

In his chapters on Manchuria, Dr. Wu states the Chinese side. The Chinese will not and apparently cannot recognize that Japan's position in Manchuria was established by war and sanctified by Treaty and that as long as Russia continues to play her present imperialistic rôle in Manchuria, there will be no change in that position. It is most unfortunate that Dr. Wu did not regard it as necessary to state the case against Russian imperialism as aggressively as he stated the case against Japanese imperialism.

Dr. Nitobe's pamphlet is much more cheering. It is a study in human culture written by one who loves his fellow men. In a manner, Dr. Nitobe is analyzing Japan's cultural indebtedness to China and the West. Here there is no hatred, no special pleading, no distrust, only the love of a scholar for human intellectual development. And in this great affection seems to lie the basis for a better understanding among nations. Dr. Nitobe does not exalt Japan beyond her mead—rather does he attempt to fit Japan and the Japanese into the world cultural picture.—G. E. S.

His Asiatic Eminence

Josef Washington Hall has written another book. His latest effort is entitled "Eminent Asians" in which according to the Publishers he "applies for the first time the methods of modern biography to men of the Orient." The six eminent Asians of whom Mr. Hall writes are; Sun Yat-sen, Mahatma Gandhi, Josef Stalin, Mustapha Kemal, and Yamagata and Ito of Japan, all of whom Mr. Hall is said to have had personal contact with. The cover includes the biography and picture of a seventh Asian personality that merits reproduction;

"Josef Washington Hall (Upton Close) has had a career in the Far East as adventurous and romantic as any Marco Polo. He has been a secret agent for the United States Government in China; was on the staff of General Wu, when dictator of China, as Chief of Foreign Affairs. He has been editor of a Peking daily that is descended from the oldest newspaper in the world and he has made a tour of Japan at the expense of that government. Of Mr. Hall, Lord Northcliffe once remarked, "I wish I had a hundred young men who knew as much about China as Upton Close."

Shades of Morrison and Chirol! If the great god of Thunder had only taken this young Seventh Day Adventist Missionary and whipped into him a real newspaper man and sent him back to China as Correspondent of *The Times*, he would long ago have been High Adviser to the Chinese Government.

The omission of the Publisher's biography from the pages of the book itself is a rank injustice to the author.

Technical Journalism in India

The *Indian Textile Journal* which represents the textile and allied industries of the country enters upon its 40th year of publication with the October issue. The progress of the textile industry and other manufactures in India have been considerable during the existence of the Journal which continues to enjoy the happy position of being under one and the same editor who first established it in October, 1890. Since then the *Indian Textile Journal* has rendered valuable services in the training of the mill and factory staff by disseminating useful information and technical articles on machinery and appliances. The question of Technical Education at the early stage which the Journal was in a position to tackle with some authority helped materially towards the establishment of technical schools all over the country which transferred the attention of young India from the non-productive to the more useful

and remunerative occupations. Among other subjects that engaged the special attention of the *Indian Textile Journal* were the extension of industrial works, the starting of new factories and the equipment and ventilation of cotton mills with special relation to the processes of manufacture and the health of the operatives. The factory training of the editorial staff and contributors of the periodical has proved of practical value to the readers and provided much useful information for them. The October issue of the Journal is a creditable production in point of the variety of articles on trade and technical subjects and copiously illustrated accounts of new cotton mills, machinery and appliances.

We offer our congratulations to the publishers and printers of the *Indian Textile Journal* on the excellence of their production and to the editor and his colleagues on the solid and practical utility of its literary contents.

F. I. B. REGISTER OF BRITISH MANUFACTURERS, 1929-30.

As usual, this volume is the most complete directory of British manufactures, carefully indexed and cross-indexed according to firm's products and brands, so that the searcher for data with regard to British manufactures may find exactly what he wants. British manufactures in 1916 joined together in this Federation so that a body might exist to deal "co-operatively on behalf of industry as a whole with governments or other interests at home or abroad; individually in the thousand and one services it renders to individual firms and associations." The Directory is invaluable to those who are interested in any phase of British industry.

THE CHINESE ARCHITECTS AND BUILDERS COMPENDIUM, Edited by J. T. W. Brooke, A.R.I., B.A., and R. W. Davis, Shanghai, North-China Daily News and Herald, Ltd. 1929.

The fifth issue of this year book maintains the standards set by its predecessors. Invaluable information with regard to land values, real estate procedure, municipal regulations, in both the International Settlement and the French Concession is provided. The section providing essential data with regard to building regulations and practices here is followed by informative advertising with regard to building materials.

CHINA STOCK AND SHARE HANDBOOK, 1929, compiled by C. R. Maguire, Shanghai, North-China Daily News and Herald, Ltd.

This compendium of information in stocks, shares and bonds is a very valuable annual which provides exact information with regard to companies in China. In addition, there are lists of members of various associations related to these subjects, such as the Shanghai, Hankow, Peking, Tientsin and Hongkong Brokers' Associations.

Information is provided on Exchange, Chinese Government Bonds, Municipal Bonds, Bank, industrial and commercial shares. Chinese as well as foreign companies are quoted and finally complete details are given with regard to each company. No one should invest in Far Eastern securities without consulting this book.

MINING OF ALLUVIAL DEPOSITS BY DREDGING AND HYDRAULICKING by W. E. Thorne, M.INST.M.M., and A. W. Hooke, M.INST.M.M. Published by Mining Publications, Ltd., London.

It is 20 years since the last text book on alluvial mining was published and in the interval many and various have been the changes that have taken place in these methods for the recovery of gold, platinum and tin from the soil. Moreover, there has been a great extension of dredging and hydraulicking since the War by reason of the fact that so much tin is won that way and this metal until the past year enjoyed a very enhanced price.

The present volume by Messrs. Thorne & Hooke is therefore overdue but now that it has made appearance it is going to supply a long felt want. The authors are well known in this field of mining and they have assembled into remarkably small compass a great mass of information, of definite value to the alluvials operator, on prospecting and valuation, methods of working ground, sluicing, elevating, dredge design and equipment, and dredging practice—to mention just a few of the sections into which the work is divided.

Hulutao Harbor Construction

It was recently announced that the National Government of China has entered into an agreement for the development of Hulutao Harbor with the Netherlands Harbor Works Company of Amsterdam, Holland. The contract involves G.\$6,400,000 and is secured on the earnings of the Peking-Mukden Railways. The port is to be the terminus of the Chinchow-Aigun Railway.

The development of Hulutao was first projected in October 1910. It was expected to connect the Port with Lienshan, $7\frac{1}{2}$ miles away on the Peking Mukden Railway. The work was however, suspended in 1911 and has not been taken up since then. The problem is to create an artificial harbor by dredging. A breakwater has been partially built but no other work has been done.

According to the plans of the Northeastern Communications Committee, which is in charge of the work, construction should begin in March.

The official statement of the Nanking Ministry of Railways with regard to the project gives the following data:

General Kao Chi-yi, Managing-Director of the Pei-Ning Railway Administration, acting under the instruction of the Ministry of Railways of the National Government and the supervision of the North-Eastern Commission of Communications, signed on behalf of the Pei-Ning Railway Administration while the Netherlands Harbor Works Company was represented by Mr. Robert de Vos, their general representative for China.

The works to be done under this contract consist of the construction of a breakwater, quay-wall, construction pier, and retaining dykes; the dredging of a harbor basin and an entrance channel; reclamation of low grounds and a part of the foreshore; and the excavation of Pan Lan Shan and Kao Liang To Tou. According to the terms of the contract, the Netherlands firm promises to carry out the execution of the works immediately and to deliver over the whole of the works to the Pei-Ning Railway Administration before October 15, 1935, or within five and a half years from the date of starting actual work.

Upon signing this contract, the railway administration will deposit a sum of \$1,000,000 local currency with a Chinese bank to be mutually agreed upon, to the credit of the Hulutao Harbor Reserve Fund. The contract sum will be paid by the railway to the contractor in monthly instalments of G.\$95,000. Within three days of the date of signing this contract, the contractor provides a banker's guarantee to the satisfaction of the railway administration amounting to \$500,000 (silver dollars) as a special guarantee for the fulfilment of this contract.

It is further provided in the contract that the railway administration may within the contract time open the Port of Hulutao and use a completed portion of the works for commercial purposes. The contractor will conform, according to the agreement, with all the laws and regulations of the Chinese Government. If either of the contracting parties or both should fail to fulfil the obligations imposed under the contract the two parties will endeavor to come to an agreement agreeable to both. If any disputes arise between the railway administration and the contractor as to the interpretation of the contract, the question shall be decided by a Commission of Arbitrators. This Commission shall be composed of three members, one of them to be appointed by the railway administration, one by the contractor within two weeks after given written notices, and the third by agreement between the other two.

It is also stated in the contract that the contractor shall pay to the Chinese administration \$1,000 (silver dollars) as liquidated and ascertained damages for every day of delay in the completion and delivery of the works to the Chinese Government, within the time-limit stipulated in the contract.

The Ministry of Railways has approved this contract.

In Chinese circles, there is talk about Japan protesting against this agreement, but this must be incorrect, as no treaties or agreements with Japan are effected. Nor can any construction which is planned for Hulutao in any way affect Dairen as is suggested. Dairen, with its extensive and extremely expensive harbor and facilities, served by a highly efficient and up-to-date railway system, could hardly be threatened by a small port, served only by a railway

fed by not very efficient branch railways, and located less conveniently with regard to world traffic. Furthermore, the amount which is proposed to be spent for the entire Hulutao development is considerably smaller than the cost of even one of the many wharves of Dairen, so that whatever competition may be caused will be infinitesimally small. As a matter of fact, some years ago when the Hulutao project was brought up, as it has been on many occasions in the past, a Japanese contractor who wished to bid on the project was informed by the South Manchuria Railway that no objection existed.

Manila's Municipal Water Supply

BACK in the days when the Philippine Islands were possessions of Spain, one General Francisco Carriedo, a Spanish gentleman willed to the city of Manila a fund which was to be invested until such time as it reached a sufficient sum to furnish the inhabitants with an up-to-date water supply.

The fund—established in 1743, with an initial deposit of 10,000 pesetas, was invested and reinvested, and after a number of advances and set-backs in the course of 120 years, the amount was considered sufficient to carry on the work for which it was intended. In 1865 two projects were prepared by Don Genaro de Palacios y Guerra, the engineer selected to carry on the work. The first provided for a Roman system or gravity supply and was estimated to cost many times more than the total value of the fund at the time. The substitute provided for a pumping station, and this was to cost 745,509 pesetas, (about four times the amount of the Fund). In view of this shortage the City of Manila by a Royal Order was directed to contribute 100,000 pesetas from City Funds; but this was not carried out since the various municipalities concerned argued that such a course, besides being expensive, would be detracting from the glory of Carriedo. The solution of the difficulty consisted in levying a special tax on meat and this continued in force until the American occupation. Due to the energy of Governor General Don Domingo Moriones y Murillo, the water-works were finally started on January 23, 1878, and finished in August, 1882, without any contribution from the City.

The Santolan pumping station of this system had a capacity of 8,000 cu. metres daily,—equal to about one-tenth the demand of to-day. However, since there were comparatively few sanitary facilities at the time, this supply was made to suffice.

In 1902 bonds were issued for increasing this supply, and from then onward it was a race between supply and demand. The very latest in water supply developments is embodied in the newest activity. Near Ipo, Island of Luzon, is the new Angat Dam site which will drain a watershed of 62,309 hectares (approximately 153,903 acres). From the dam the water is conveyed through the Angat-Novaliches Aqueduct to the Novaliches Dam and Reservoir, then through the Novaliches-Payong Aqueduct to the existing pipe line from Montalbon Dam and thus to the city reservoirs.

The Angat River is located in the Bulacan province and the distance from Manila to the proposed dam at the junction of the Angat and Ipo, a small tributary river, is thirty-five kilometers (approximately 22 miles) as the crow flies.

The Angat gorge is most picturesque and will be reached by a first-class Nova macadamized roadway winding through a succession of beautiful scenes. The building of this road is a portion of the water development project. The numerous intersecting waterways which do not require the construction of large bridges are cared for by Armeo culverts, something over 3,500 feet of 24-in. and 30-in. diameters being employed. Safety of vehicles and travelers is promoted by protecting dangerous curves with Page Highway Guard.

Some 2,000 workmen are employed in carrying out this project (under the direction of Paul W. Mack, Engineer). Its completion will give to Manila a water supply which, at the present rate of the city's growth should be sufficient for all its needs for half a century.

World's Largest Shale-Oil Plant

Now Completed By South Manchuria Railway Company at Fushun, Manchuria

New Plant Costs More Than Y.10,000,000

BITTER experiences, in the European war, have urged nations to establish their own oil policy. The United States of America, to-day, commands the oil industry; and exports large quantities of crude and refined oil to various parts of the world. Parts of the British Empire are rich in oil, but due to the great importance of this commodity, British experts experimented and found a method in which oil could be manufactured from oil-shale on a commercial basis.

The shale-oil industry in Scotland has been compelled, however, in recent years, to retrench its scope of industry by degrees, due to the competition of the petroleum industry, which has annually been growing in prosperity.

Japan's oil resources are poor, in fact there is practically no large oil fields in the Japanese Empire.

There is, at Fushun, (where the largest open cut coal mine in the world is at present located) a large quantity of oil-shale.

It has been estimated that there is over 5,300,000,000 tons of oil-shale about Fushun of which 200,000,000 tons can be excavated from the present open cut mines. Approximately 1,400,000 tons of shale will be used annually in the new plant. Japanese experts state that the rest of the billions of tons of shale can be used in the present plant but not on an economical basis, as it will involve great expense in mining and transporting this shale to the new plant.

Before the World War (1914-1918) the Japanese authorities in charge of the coal industry at Fushun paid little attention to the value of this shale. Indeed, the Japanese found the shale to be a great nuisance while digging for coal. To get rid of hundreds of tons of this shale became a burden and an expense to the company. At first the Japanese authorities tried to negotiate with the Chinese

for the purchase of a small strip of land near the coal fields where the shale could be dumped. The Chinese refused to sell. The Japanese, thus handicapped, had no other choice but to carry away most of the shale by rail to a further distance at a great expense.

About ten years ago, a few Japanese engineers were sent by the South Manchuria Railway Company to Scotland to study the method used by the British experts of procuring oil from oil-shale. Returning to Fushun, these engineers tested the oil-shale, and found that the quantity of oil in the shale was very small, averaging about five and six per cent. Its quality is far inferior to the Scotch shale which contains about 8 to 10 per cent oil.

The Fushun shale became an important but difficult problem. The shale had to be removed before the workers could dig and shovel for coal. If oil could be extracted from the shale on a commercial basis, then the burden of dumping the waste would be gone. Instead of carrying away the waste to a dumping ground, the material could be used to fill portions of the excavated coal mines. Formerly sand was used which had to be purchased through a Chinese concern located near Fushun. Although some sand is still utilized to fill the excavated coal sections, the Japanese authorities hope to eliminate this expense in the near future.

With these two thoughts in mind the Japanese experts, in the service of the South Manchuria Railway Company, experimented and devised various methods to construct a plant

that could manufacture oil from the shale on a commercial basis. One failure after another was the discouraging reward these experts received, but after ten years of experimenting, a method was found.

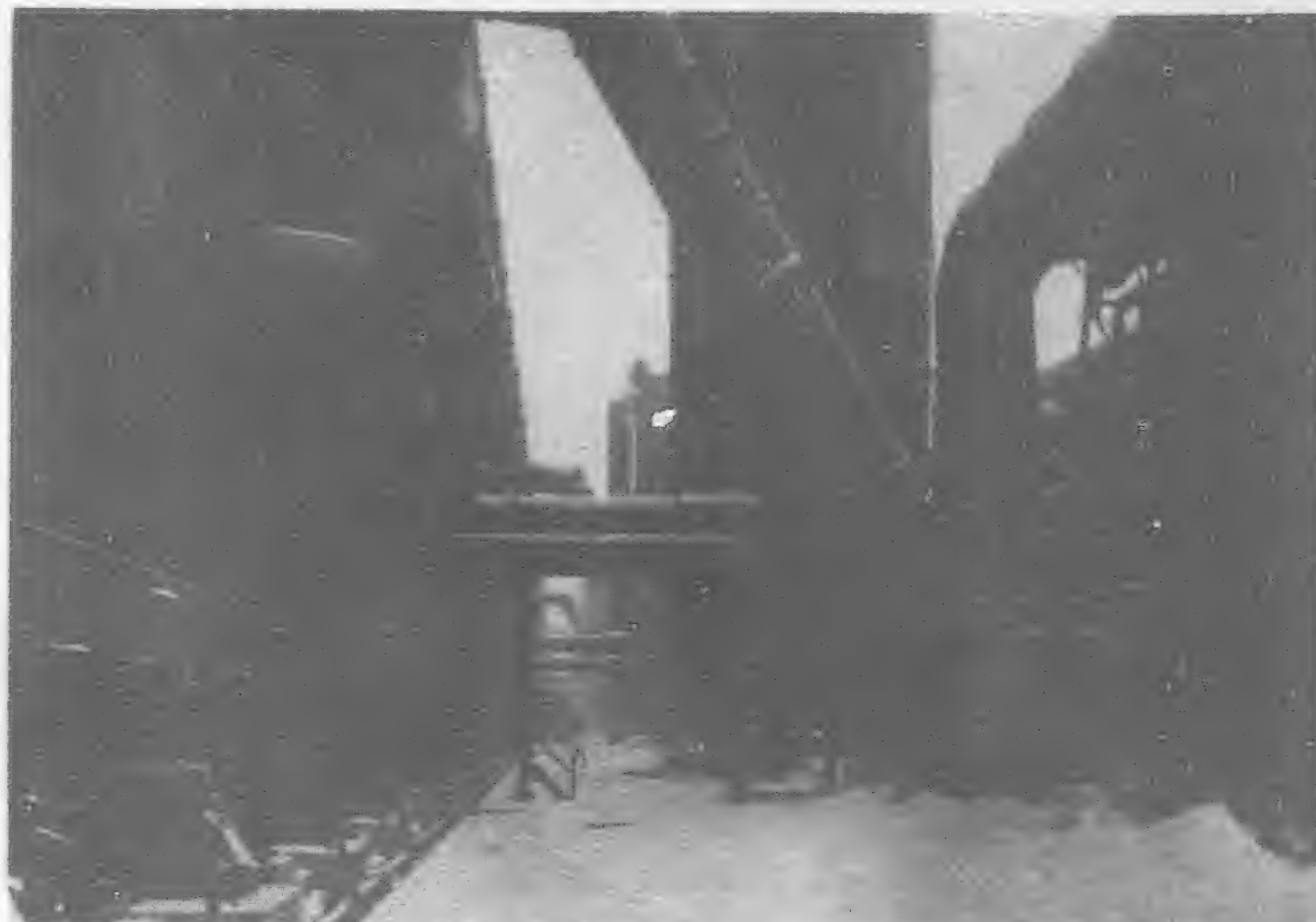
The engineers in charge of this enterprise at Fushun invented a special retort for the dry distillation system. The experiment with this retort proved a great success. By this invention, the



Rear Admiral Toyotsuke Makino, of the Japanese Imperial Navy, who joined the South Manchuria Railway Company to Render His Services in Connection with the Oil-shale Project at Fushun.



Extracting Oil Shale at Fushun



Pipe Arrangement Placed Between Retorts and Gas Absorber



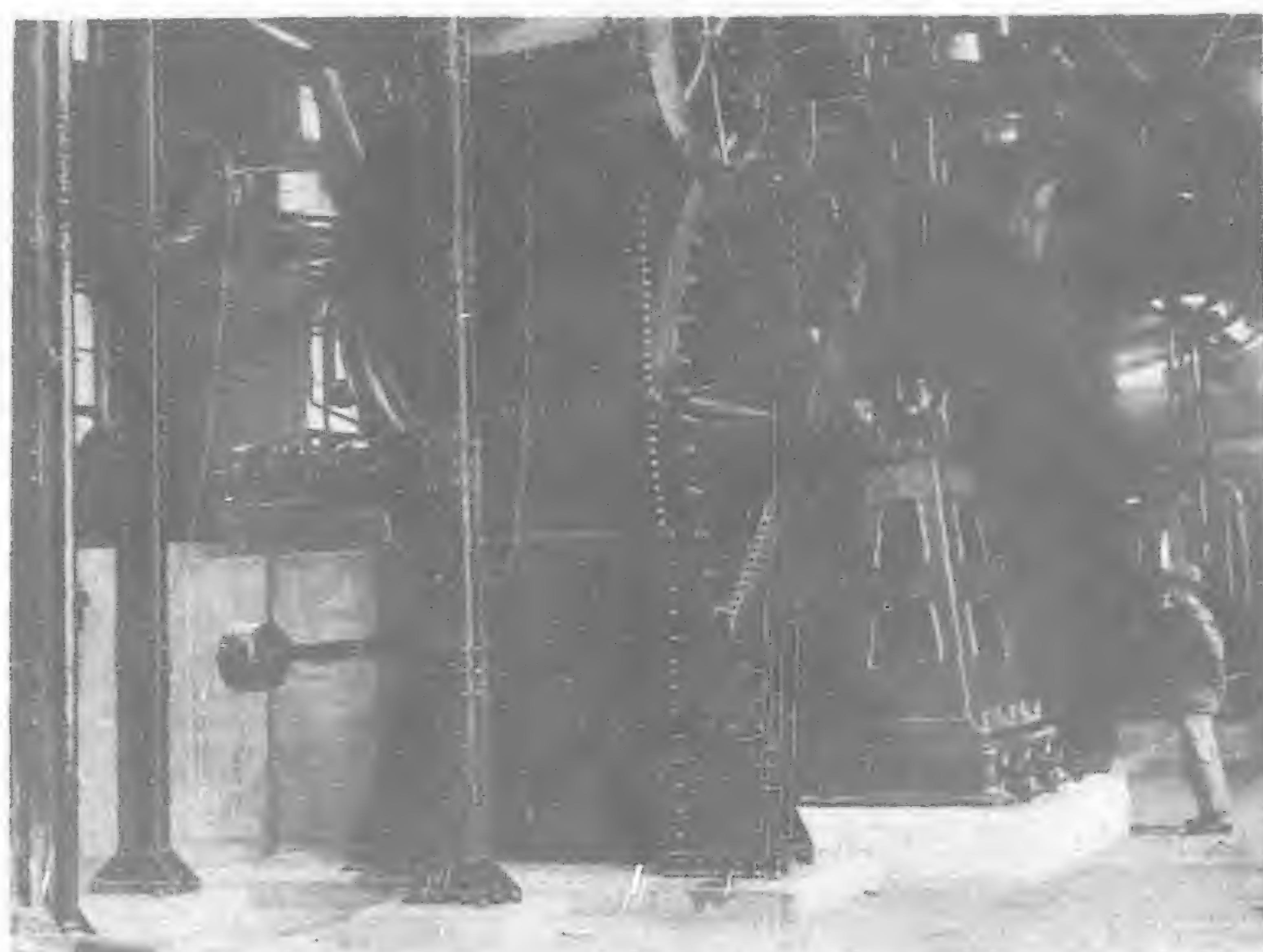
Oil Shale on Hillside—Coal at Botton at Fushun

shale in the open cut, which was formerly regarded as waste, has now become to be utilized as a very important fuel, making a great contribution towards the fuel oil industry. The shale-oil industry will supply not only heavy crude oil, but also several by-products such as sulphate of ammonia, paraffin and coke.

About 70,000 tons of crude oil and 18,000 tons of sulphate of ammonia will be manufactured annually in the new plant. Paraffin and coke will also be obtained from crude oil by the present plant.

To-day, at Fushun, the most up-to-date shale-oil plant in the world is now a reality. Oil is being produced from the shale, poor grade as it is, on a commercial basis. It cost the South Manchuria Railway Company Y.10,000,000 to construct the plant which took a year and a half to build.

Although the petroleum industry is now at its peak, many international experts on fuel consumption believe that in time the shale-oil industry



Disintegrater for Crude Oil at New Shale Oil Plant at Fushun

will succeed petroleum. The shale-oil industry is practically a new enterprise and is still in the embryonic stage.

Foreign experts on coal and oil-shale have wondered why Japan does not produce oil from the coal as Germany is now doing. It

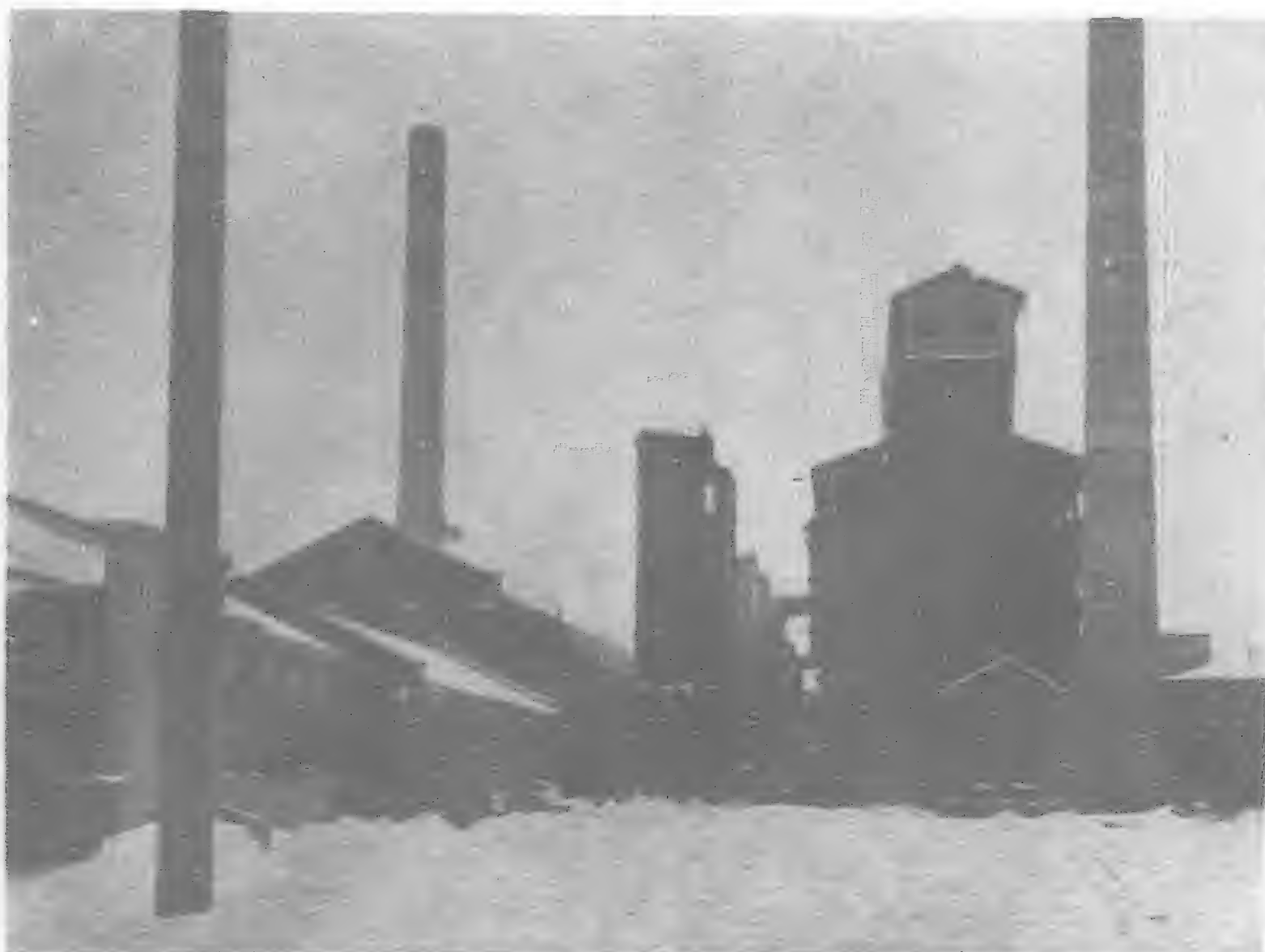
must be remembered, however, that the coal mines in Germany have little or no oil-shale to contend with, while there are billions of tons of shale at Fushun. Now that a method has been found where oil-shale can be used on an economical basis, several Japanese experts, well trained in the low temperature carbonization of coal, are now investigating whether it is worth while to produce oil from the coal. No decision has yet been made.

Since Fushun is in Chinese territory, a regular export tax will be levied by the Manchurian authorities on the shale-oil and by-products. The Japanese government has also decided to levy an import tax on any of the products manufactured by the Fushun plant that is sent to Japan.

(Continued on page 79).



The New Shale Oil Plant at Fushun



Section of the New Shale Oil Plant at Fushun



Front Section of Shale Retorts at New Shale Oil Plant at Fushun

The New Siam Cement Company Extensions

THE Siam Cement Company, Ltd., which was organized in June, 1913, is a Siamese Company, while the management is Danish. The first plant was put into operation in May, 1915, and consisted of a 34 metres kiln, while the extensions carried out during 1922-1923 added a 58 metres kiln to the plant. New extensions have just been made, adding a 75 metres Unax kiln to the plant.

The suppliers of the machinery have exclusively been the well known cement machinery makers in Copenhagen, Messrs. F. L. Smidth & Co. A/S, and after carrying the present extension throughout the plant should reckon amongst the most modern in the Far East. The European staff consists at present of T. Haastrup Nielsen, Esq., Works Manager; C. Friis Jespersen, Esq., Civil Engineer; A. Bay Nielsen, Esq., Engineer; G. Hoffmann, Esq., Accountant.

The Works of this Company, situated at Bangsue seven miles north of Bangkok, are now approaching the completion of an extensive reconstruction and enlargement. The extended Works will have an annual output of about 700,000 barrels of cement.

The raw materials are marl and clay, and the clay is found in almost unlimited quantities near Bangsue and conveyed by boats to the plant, whereas the marl is received at the Works railway sidings. The output of raw materials required is 900 tons per day.

The clay is handled by an electrically driven monorail trolley crane with grab. It is operated by means of controllers installed in a closed control cabin and the power consists of a 30 H.P. motor for the hoisting machinery as well as a 12 H.P. motor for the travelling machinery. The grab will discharge into a clay washmill, 7,800 m.m. diameter, of standard design, direct coupled to a 75 H. P., 500 Volts, 3 phase asynchronous motor with built-in precision gear for reduction 1,450/100 R. P. M. From the mill the clay slurry is pumped by a three-throw slurry pump to the clay reservoir.

The marl is transported by light trucks and tipped into two marl washmills. The marl slurry gravitates from the washmills to three elevators lifting the slurry into a feeding hopper for three grinding tube mills of which the last acquired mill is a Danula Chamber Mill

of inside diameter 1,800 m.m. and inside length about 6 metres. The mill is divided into two chambers, one with manganese steel lining and designed for a charge of 5.5 tons of grinding balls, and the other with Silex lining and designed for nine tons of Cylpebs. The gearing consists of cast steel spur rim and pinion both with machine-cut teeth, and equipped with oil-tight gearguard with oil pump and filter. The countershaft is arranged for direct drive from a 225 H. P. motor through a separate precision gear reducing from 720 to 140 R. P. M.

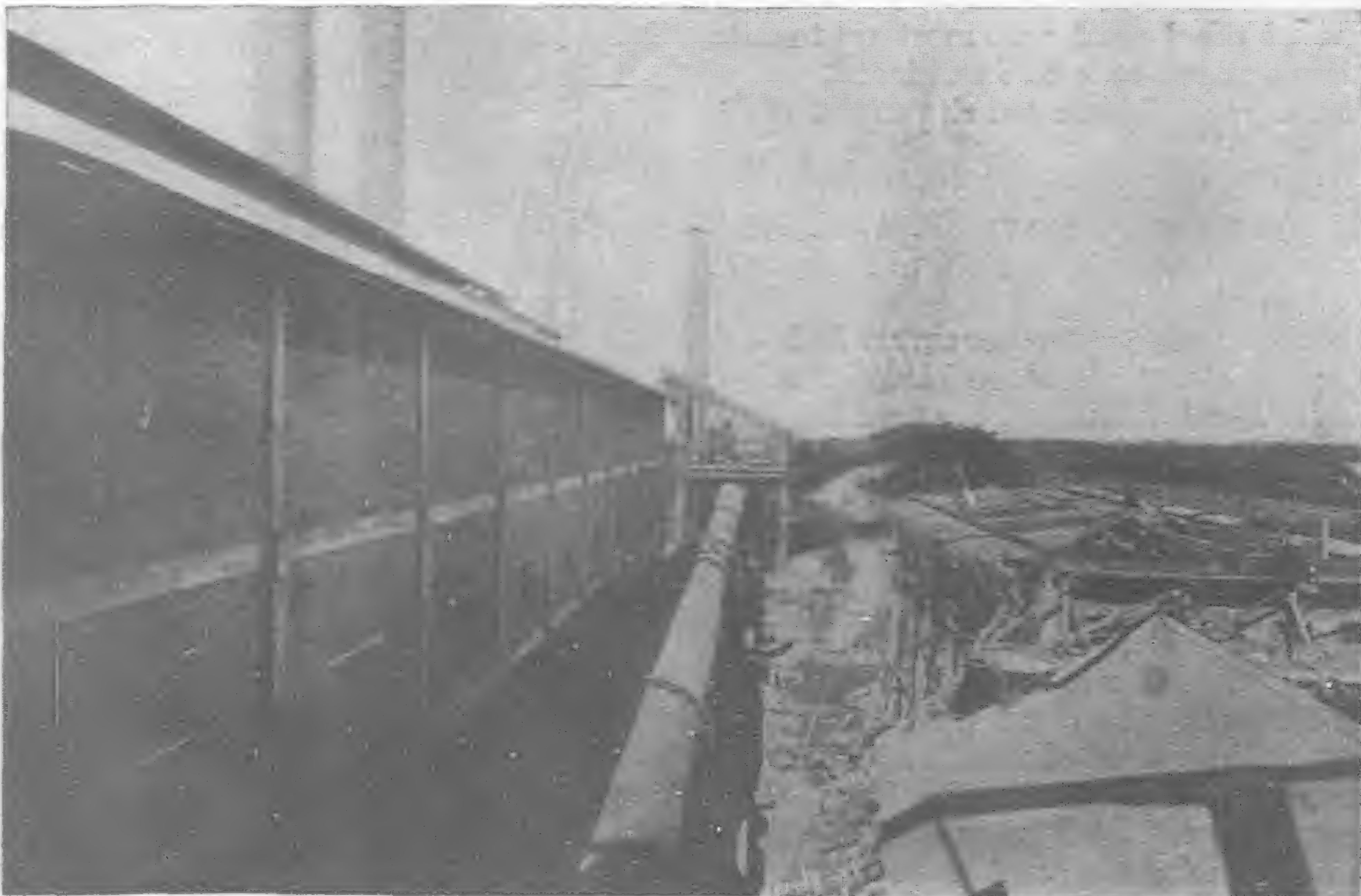


View of Factory During Extension. Note Ferro-Concrete Constructions for Carrying Monorail for Clay Transport to Wash Mills

diameter of each cylinder 140 m.m., length of stroke 220 m.m., are installed for conveying the slurry to the rotary kilns through a rotating scoop feeding apparatus, the speed of which can be regulated from the burners platform, and the drive consists of direct current motors, 220 Volts, with dust tight shunt regulators. The direct current is generated by a motor generator for converting 500 Volts alternating current into 220 Volts direct current, consisting of one squirrel cage motor coupled direct to a 5 k.W. dynamo.

The extended works consist of three rotary kilns, and it is

interesting to note that whereas the original kiln from 1914 is only 34 metres and the kiln erected during the extension of 1922 is 58 metres the new kiln just put into operation is 75 metres long. The last kiln is a Unax kiln; the diameter of the kiln tube 2.1 metres with widened burning and drying zone being 2.4 metres in diameter. The kiln is fitted with Unax cooler and the total length of kiln tube and cooler about 79.5 metres. The tube is made of riveted edge-planed steel plates and rests on five heavy roller supports with water cooled swivelling

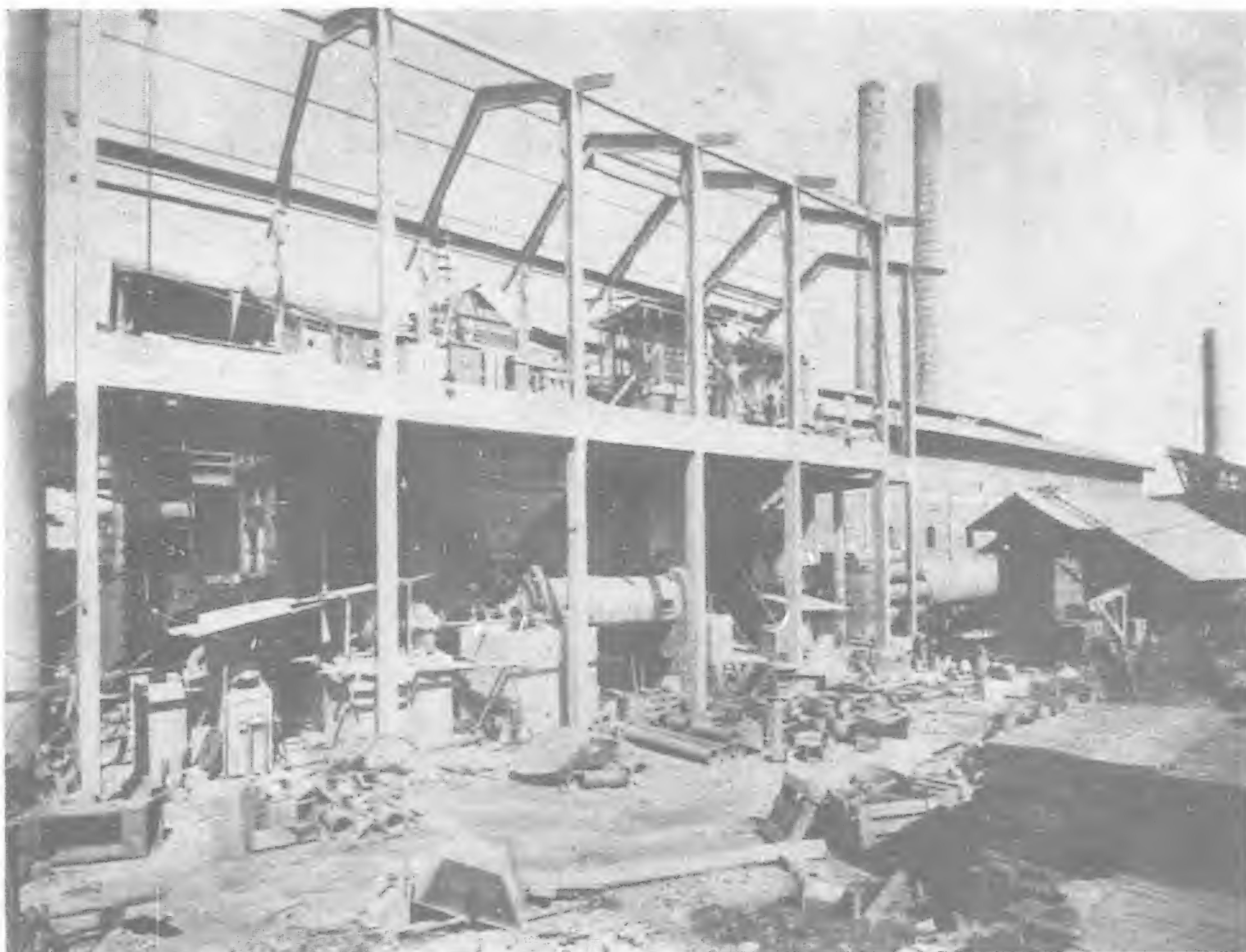


75-lb. Unax Kiln Just Erected, December, 1929

bearings placed in large sole plates with recesses for water and oil to keep the faces of the live rings and supporting rollers well cooled and greased. The kiln is equipped with a chain system to facilitate the drying of the slurry and further with a tightening device between kiln and smoke chamber. The countershaft is arranged for direct coupling to a 55 H.P. 3 phase asynchronous motor with built-in precision gear for reduction 1430/60 R. P. M. and air cooled starter capable of regulating the speed continuously 57 per cent. downwards. The kiln is fired by means of coal dust and the firing gear consist of a double coal measuring worm driven by belt from variable speed direct current motor, and a high pressure fan, diameter of wing wheel 1,000 m.m. The exhaust gases leave the kiln through a medium pressure fan and all dampers can be regulated from the burners platform. From the kiln the clinkers are discharged into a concrete elevator of the slow-speed type, designed for internal discharge, and lifted for transport to the clinker store before grinding.

The pulverized fuel is, before grinding, dried in rotary dryers, diameter 1.2 metres and length 12 metres, equipped with push feeding devices for regular feeding of the coal. Each dryer is supplied with hot air from a special mechanical grate. The dried coal is ground in Danula Chamber Tube Mills of a type similar to those in the raw mill plant. And the coal dust is then by elevators and worm conveyors transported to the dust feeding hoppers of the kilns or carried to the dust silos for reserve.

In the completed cement mill plant the original Kominor Tubemill aggregate will be supported by two Unidan mills, each with an inside diameter of tube 1 800 m.m. and inside length of 11 metres. The mills are supplied with mill heads of cast steel and shells of boiler plate, and are each divided into three compartments separated by diaphragms of special design. The first two compartments are lined with manganese steel, the last compartment with a special, wear-resistant dragpeblining. The mills are fitted with Danula equipment for increasing the grinding action. The main bearings are water-cooled. Each of the mills is driven by a 330 H.P. 3 phase asynchronous motor with separate precision gear. The mills are fed by adjustable, automatic feed tables, diameter 1,000 m.m., for feeding gypsum and clinker regularly. On a rubber belting conveyor the finished cement is transported to the large



Coal Mill Extension Under Erection, December, 1929

cement storage silos and by pneumatic packing machines discharged into gunny bags, paper bags or wooden barrels.

The whole cement works is electrically driven throughout, 3 phase alternating current being received by the Government Power Station near by and in the Works substation in air cooled, oil isolated, transformers converted from 3 200 Volts to 520 Volts. The substation is equipped with oil circuit breakers with built-in high voltage overload relays and no-volt relay, as well as Kilowatt-hour meters. All motors are connected to suitably situated distribution boards by paper insulated, lead covered, steel tape armored cables.

When the extension is completed the plant should have about 300,000 casks available for export after covering the full consumption of cement in Siam, and prospects for working up an export business seem quite bright owing to the good reports passed on the quality of this cement by Municipalities in Singapore, Penang and elsewhere.

New Hangchow Electricity Plant

THE Chekiang Electricity Bureau which is closely associated with the National Construction Commission has recently placed contracts for one of the largest and most up-to-date Electric Power Station equipments yet ordered in China.

The Station will be built on a specially selected site on the banks of Chien Tang River.

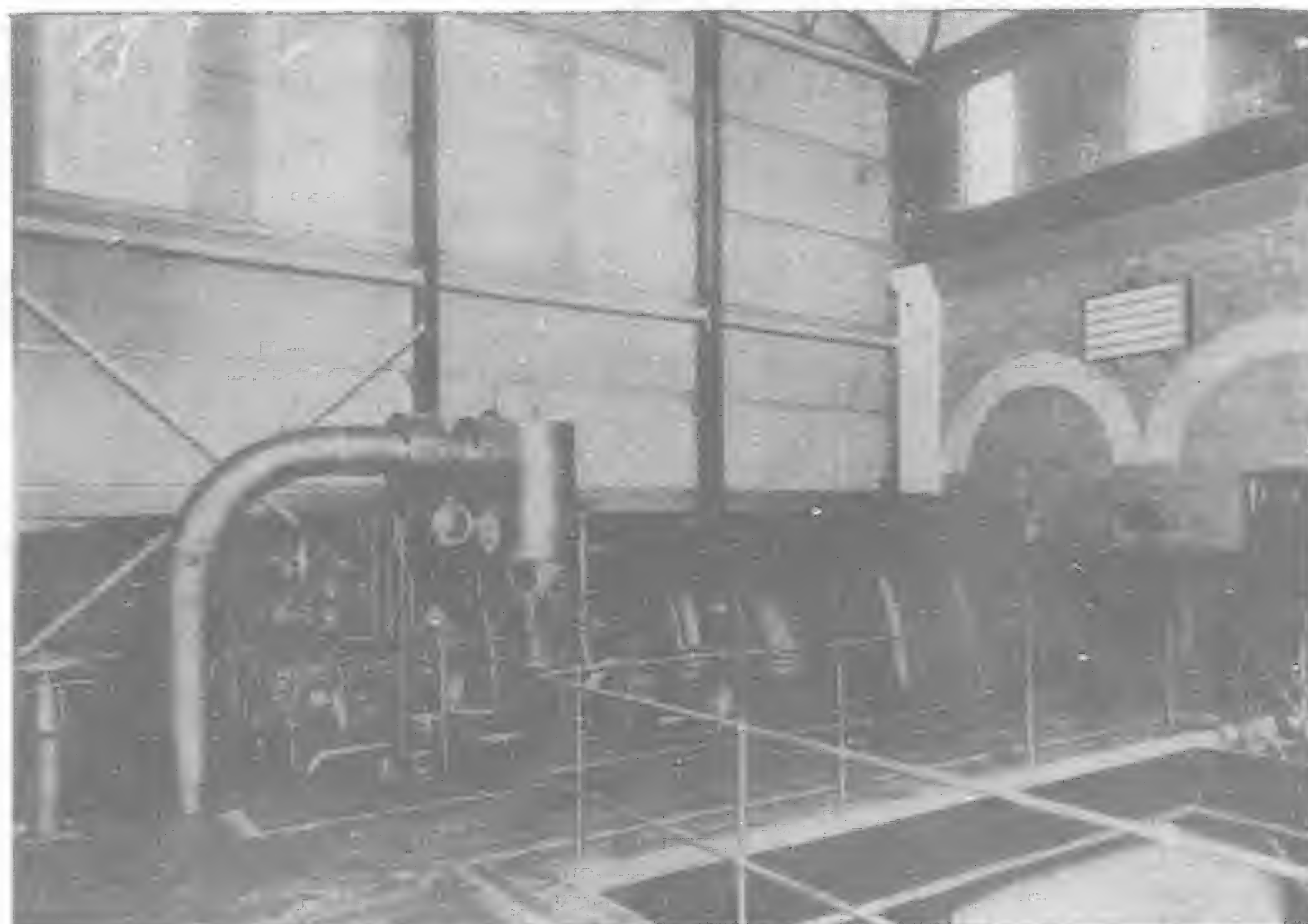
The Contract for the electrical plant has been secured by Messrs. Inness & Riddle (China) Ltd. and is for two B. T. H. 7,500 kW. super-efficient 18-stage turbo-alternators which will generate direct at a pressure of 14,000 volts.

The steam conditions are pressure—350 lbs. per square inch and temperature 720°F. Low pressure steam will be bled from two stages of the turbines for feed-water heating and evaporating.

The sets will be generally similar to the B. T. H. turbo machinery which has recently proved so successful in the P. & O. s.s. *Viceroy of India* and will be manufactured at the British Thomson-Houston Company's works at Rugby.

The boiler plant, the contract for which has been awarded to Messrs. Andersen, Meyer & Co., Ltd., will consist of two units, each capable of producing 75,000 lbs. of steam per hour. Pulverized coal will be fed to each furnace by two unit type pulverizers. Superheaters and economizers will be integral with the boiler, the whole forming the most modern plant of the kind in China. The boilers, superheaters, economizers and pulverizers will be the product of the Combustion Engineering Corporation of New York while the induced and forced draft fans will be the product of the American Blower Company.

Mr. Hollis H. Arnold, Consulting Engineer, 6 Kiukiang Road, designed this plant and is acting as Consulting Engineer for the Purchasers.



7,500 kW., 3,000 R.P.M., 11,000 Volt, 50 Cycle, 3 Phase Turbo-Alternator Similar to that Ordered by the Chekiang Electricity Bureau

The Growth of Branch Banking in Japan

By HERBERT M. BRATTER, U. S. Department of Commerce

ALTHOUGH the tendency toward bank amalgamation in Japan has caused a marked decline in the number of banking institutions, the number of branches has increased rapidly. In 1918 there were 2,285 banks in the Empire; in 1928, 1,163. The number of branches of Japanese banks, on the other hand, increased from 341 in 1893 to 6,036 in 1923 and 6,043 in 1927. In 1903 the number of head offices exceeded the number of branches; by 1908 the reverse was true. Since then the growth of branch banking has been conspicuous.

Growth of Japanese branch banking

Year	Number of head offices	Number of branches	Average number of branches per bank	Total, head and branch offices
1893	703	341	0.5	1,044
1898	1,751	1,383	.8	3,134
1903	2,275	2,062	.9	4,337
1908	2,172	2,447	1.1	4,619
1913	2,156	3,153	1.5	5,309
1918	2,089	4,209	2.0	6,304
1923	1,874	6,036	3.2	7,909
1924	1,799	6,100	3.4	7,899
1925	1,704	5,954	3.5	7,624
1927	1,428	6,043	4.2	7,471
1928	1,163	—	—	—

The development of Japanese branch banking is more fully revealed by the figures in preceding table.

In the next table the branch banks are divided into two groups, those of ordinary banks and those of savings banks. The figures do not correspond with those just given, but being the only ones available are here presented as showing the decline in total savings-bank branches and the increase in the ordinary-bank branches during the period from 1921 to 1925, inclusive. In 1921 the average ordinary bank had 2.4 branches and the average savings bank 3.3 branches. In 1925 the average for ordinary banks was 3.5 and for savings banks 4.5. Between 1917 and 1925 the number of ordinary banks increased 10 per cent and of savings banks declined 80 per cent. The number of savings-bank branches did not decline so greatly, showing a net loss of 62 per cent. The increase in branches of ordinary banks during the same period was 441 per cent. The data follow:

Ordinary and savings banks and their branches in Japan

End of	Ordinary banks Head offices	Ordinary banks Branches	Savings banks Head offices	Savings banks Branches	Total Head offices	Total Branches
1917	1,398	2,221	663	1,569	2,061	3,790
1918	1,375	2,374	661	1,684	2,036	4,058
1919	1,344	2,563	656	1,947	2,000	4,510
1920	1,326	2,797	661	2,128	1,987	4,925
1921	1,331	3,160	636	2,111	1,967	5,271
1922	1,799	5,163	146	545	1,945	5,708
1923	1,701	5,274	139	553	1,840	5,827
1924	1,629	5,324	136	565	1,765	5,889
1925	1,537	5,357	133	597	1,670	5,954

In 1924, in keeping with the Government's policy of attempting to prevent the too rapid expansion of banking, it was announced that the Department of Finance was undertaking stricter supervision of banks. According to the report as published in *Commerce Reports*, August 8, 1924, banks having a capital of less than Y.500,000 were not to be permitted to open branches, and considerable limitation was to be placed on such expansion by banks with a capital of Y.500,000 to Y.2,000,000.

The Yasuda Bank, with 138 branches, leads all Japanese banks, according to the *Japan Advertiser*, April 11, 1929. The item lists the branches of the Yasuda Bank as subsidiaries, which they more properly are. It further states that the Kawasaki-One-Hundredth Bank comes next, followed by the Dai-ichi Ginko with six subsidiaries, the Mitsubishi Bank with three, and the Sumitomo Bank with two. The Mitsui Bank has 17 branches in Japan and five abroad. The Mitsubishi Bank has 15 branches in Japan and three abroad. The Sumitomo Bank lists 25 branches in Osaka, over 30 elsewhere in Japan, and seven abroad. It is, moreover, affiliated with three banks in the United States and Hawaii. The Dai-ichi Ginko has six subsidiaries. Among the special banks, The Yokohama Specie Bank, the Bank of Taiwan, and the Bank of Chosen have numerous branches. Of the remaining special banks, the Hypothec Bank and the Industrial Bank have many branches in Japan proper, and of late there has been frequent mention in their semi-annual

reports, and elsewhere, of new branches and sub-branches. The Bank of Japan had, at the end of 1928, 16 branches in Japan proper. It also maintained 526 agencies for handling Government funds and managing Government bonds, and 17 agencies dealing in spoiled bank notes, according to its annual report for 1928.

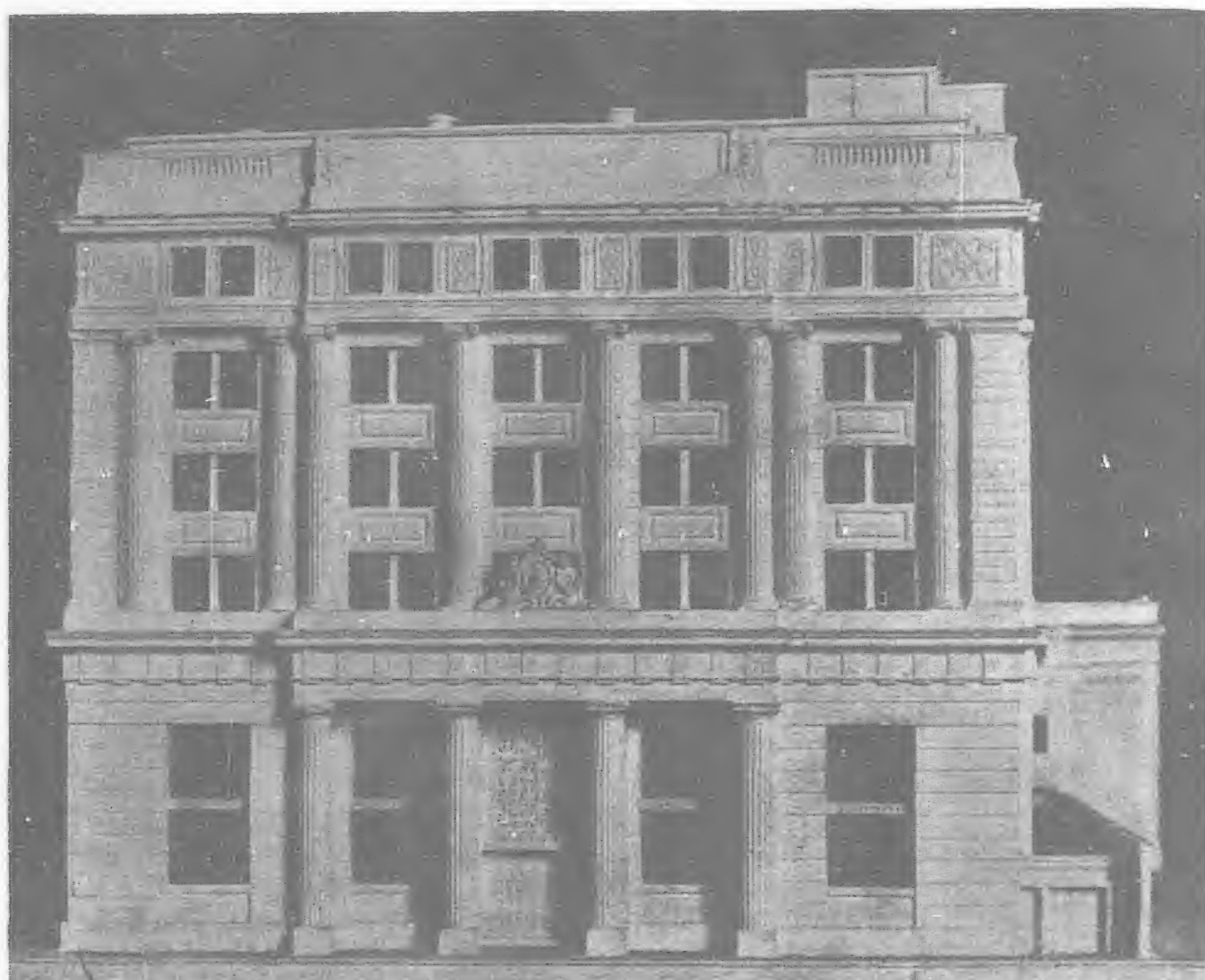
The principal fields for Japanese banks abroad have been Manchuria and China proper. The first Japanese bank to open an office in Manchuria was the Yokohama Specie Bank, which established a branch at Newchwang in January, 1900. It was followed by the Bank of Chosen, which took over the Antung branch of the Bank of Korea in 1909.

Among Japanese commercial banks in Manchuria, the first to be established was the Seiryu Bank, a Sino-Japanese undertaking founded at Newchwang in July, 1906, with a capital of Y.1,000,000. The bank was permitted to handle the cash accounts of the Kwantung government and gradually expanded. Branches were opened at Port Arthur, Mukden and Changchun and the head office was established at Dairen. Other Japanese banks in Manchuria are the Manchurian Bank, the Dairen Commercial Bank, the Choshun Industrial Bank, the Anto Industrial Bank and the Kyosei Bank. With the assistance of the Kwantung government, five societies have been established for the purpose of facilitating the supply of agricultural credit.

The number of Japanese banks in Manchuria, according to an investigation made by the Peking Bankers Association, was over 60 in 1925, including those in Kwantung Leased Territory. Their advances at the time were said to total over Y.126,400,000 and 2,800,000 dollars (local currency). In addition, in a discussion of Japanese banking in Manchuria the activities of the Oriental



Mitsui Bank, Tokyo



The Yokohama Specie Bank, Tokyo

Development Co. and of the South Manchuria Railway should be mentioned.

In the United States legal requirements have operated to the exclusion of branches of foreign banks. The Japanese banks with branch offices in the United States are the Bank of Japan (agency), Bank of Taiwan, Bank of Chosen, Yokohama Specie Bank, Mitsui Bank, Mitsubishi Bank, and Sumitomo Bank. Each has one branch or agency, excepting the Yokohama Specie Bank, which has four, and the Sumitomo Bank, which has three branches and three affiliated branches.



Mitsubishi Bank, Tokyo

In Russia the only Japanese bank at present maintaining a branch is the Bank of Chosen, which operates in Vladivostok. The Yokohama Specie Bank formerly had an office there, but closed it in 1924.

Yokohama Specie Bank Leads in Number of Foreign Branches

Following is a table showing the principal Japanese banks and agencies abroad at the end of 1928 :

Foreign branch offices and agencies of the principal Japanese banks, including banks partly owned by Japanese

Bank	United States	England	Elsewhere	Total
Special Banks :				
Bank of Japan ...	1	1	—	2
Yokohama Specie Bank ...	4	1	31	36
Bank of Taiwan ...	1	1	13	15
Bank of Chosen ...	1	—	16	17
Ordinary banks :				
Mitsui ...	1	1	3	5
Mitsubishi ...	1	1	1	3
Sumitomo ...	6	1	3	10

Although Japan's banking system, with branch banking still comparatively undeveloped, is sometimes regarded as similar to that of the United States, actually, it more nearly resembles that of Great Britain or Canada. As stated in "The Big Five in Japanese Banking," five banks hold, roughly, one-third of all "ordinary bank" deposits and 14 banks well over one-half the same total. It is this dominance of a few institutions which distinguishes the Japanese system from the American, and which made possible in Japan the costly postponement of postwar deflation until 1927.

[A copy of The Big Five in Japanese Banking, Trade Information Bulletin No. 653, is obtainable from the Superintendent of Documents, United States Government Printing Office, Washington, D. C. or any district office of the Department of Commerce, at 10 cents per copy.]

Two New Lighthouses for Osaka Harbor

The pair of lighthouses, guarding the entrance of Osaka harbor at the tips of the northern and southern breakwaters will be supplanted early in 1931 by a larger pair, giving light enough to reach out 15 nautical miles, according to the decision reached by the Lighthouse Bureau in the Communications office.

At present the harbor entrance is guarded by a pair of fifth class lighthouses, whose light reaches out but 11.5 nautical miles, whereas the larger pair to replace them, will be of fourth class, similar to the one on Iojima island off the entrance of Nagasaki harbor, one that guards the entrance to Dairen harbor and those guarding other reefy coast points.

The new pair will stand about 64 feet above the level of water, which is 25 feet higher than the existing pair, and will cost

approximately Y.45,000 to build. When they are completed, their rays are expected to reach as far out as the entrance of Kobe harbor.

The Lighthouse Bureau in deciding to rebuild the pair, is complying with the petition of the City and with the request of the harbor authorities and navigators, who suggested that the Government elevate the status of the lighthouses.

The existing lighthouses were built in 1906 by the City of Osaka and were later presented to the Lighthouse Bureau. Because of the insufficient light power, incoming vessels do not depend on them but steer their courses, taking a lighted signboard at the waterfront as their guide.

The Kanose Hydro-Electric Development on the Agano River, Japan

By KUMAO MINO, C.E., Chief Engineer to the Toshin Denki Kabushiki Kwaisha (Toshin Electric Co., Ltd.), Tokyo, Japan

As a type of low head power development, the Kanose Hydro-electric Power Plant stands as one of the largest and best examples of its kind in Japan. It is located in the Province of Niigata, 36.8 miles from the City of Niigata and 221.4 miles from Tokyo. A short light railway of three miles in length, connects the Power Station to Kanose Railway Station of the Banyetsu West Line, Imperial Government Railways, the shortest connecting line between Tokyo and Niigata.

The Aganogawa (Agano River) proper begins at the confluence of two rivers—Tadami and Nippachi—the former being fed by the perpetual snow of the high mountain ranges extending over Iwashiro and Echigo Provinces and the latter being the only outlet of the famous lake Iwashiro. It winds along over 200 miles in the northerly direction through various deep ravines and valleys, collecting countless small streams and finally empties into the Japan Sea, near Niigata. In length the Aganogawa is one of the largest rivers in Japan.

The Toshin Denki K.K. selected two power station sites, within the distance of seven miles of each other, both of the dam type, namely, Kanose and Toyomi. The Kanos Hydroelectric Power Plant ranks at present as one of the largest, if not the largest, power plants of low head or dam type in Japan. Its total power is delivered to Tokyo over the Tokyo Electric Light Co.'s Transmission Line at 154,000 V., a distance of over 170 miles. It has the effective head of 74-ft.; max. available water quantity of 8,000 cu. ft./sec.; total output of 40,000 kW. From the standpoint of speed of construction, it has no parallel in Japan. The work was started September 1926 and on December 1, 1928, a trifle over two years after the breaking of the ground, power was successfully and continuously transmitted to Tokyo.

The Toyomi Plant now under construc-



K. Mino, Chief Engineer

tion with the same speed is expected to be completed and in operation by December of this year. It is of 45,000 kW. capacity and is almost identical to the Kanose Plant.

General.—The fact that for its greater part the Aganogawa runs through mountain regions, bordered on either side by ranges of steeply rising hills, offers sites most suitable for dam construction and the following reasons are given for the decision in favor of dam-type development.

- 1st Comparatively large quantity of water requires a large and expensive water way or tunnel.
- 2nd Low grade of water flow necessitates a comparatively long water way.
- 3rd Steep nature of ground on both sides causes comparatively small area to be submerged in case of dam construction.
- 4th Dam type Power Plant is ideal for peak load station.

If the tunnel type were employed to develop powers at these two sites, it is doubtful if the combined output would exceed probably 25,000 kW., whereas 85,000 kW. are obtainable by the dam type. By construction of a dam across the river at Kanose, Higashi-Kanbara-gun, Niigata-Ken and locating the forebay and power house at the left side of the dam, on a table land, where excellent foundations are found, the effective head of 74-ft. is obtained. (See Fig. 1.) The drainage area above this place is about 2,400 sq. miles. Hydrographic surveys covering many years give the minimum discharge as 4,000 cu. ft./sec. and the average discharge as 8,000 cu. ft./sec.

From the above, we can in the low water season utilize the water at the rate of 3,200 cu. ft./sec. for 20 hours and 8,000 cu. ft./sec. for 4 hours causing a fluctuation of only 4-ft. head on the reservoir level. This condition meets the daily peak load demand in the most satisfactory manner.



Kanose Hydro-Electric Power Plant on the Agano River, Japan

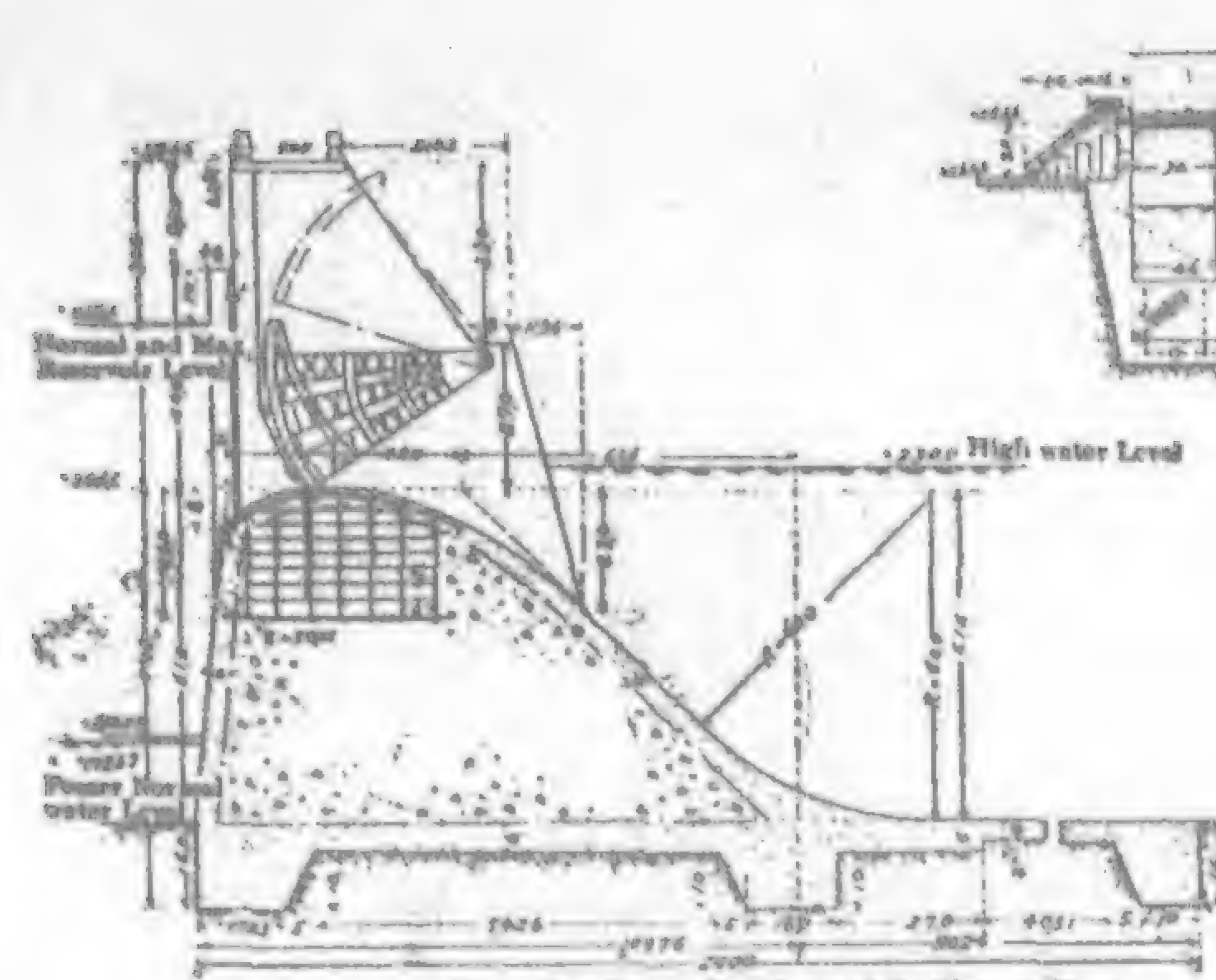


Fig. 3—Cross Section of Spillway Dam
Remark; Linear unit is foot

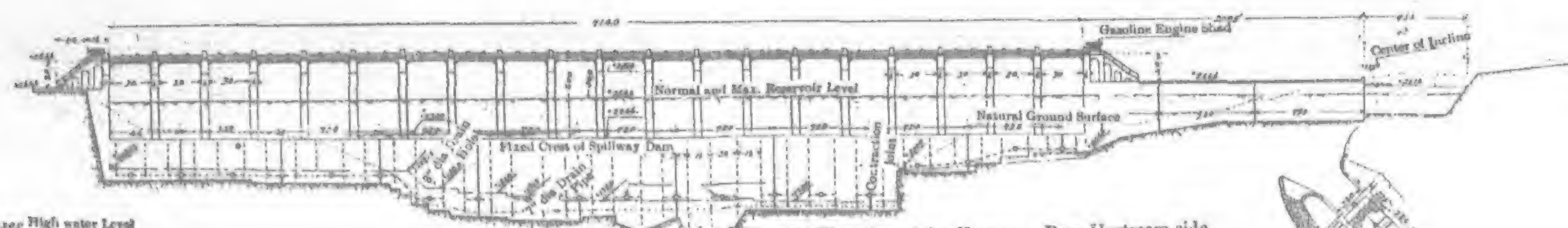


Fig. 2—Elevation of the Kanose, Dam-Upstream side
Remark; Linear unit is foot

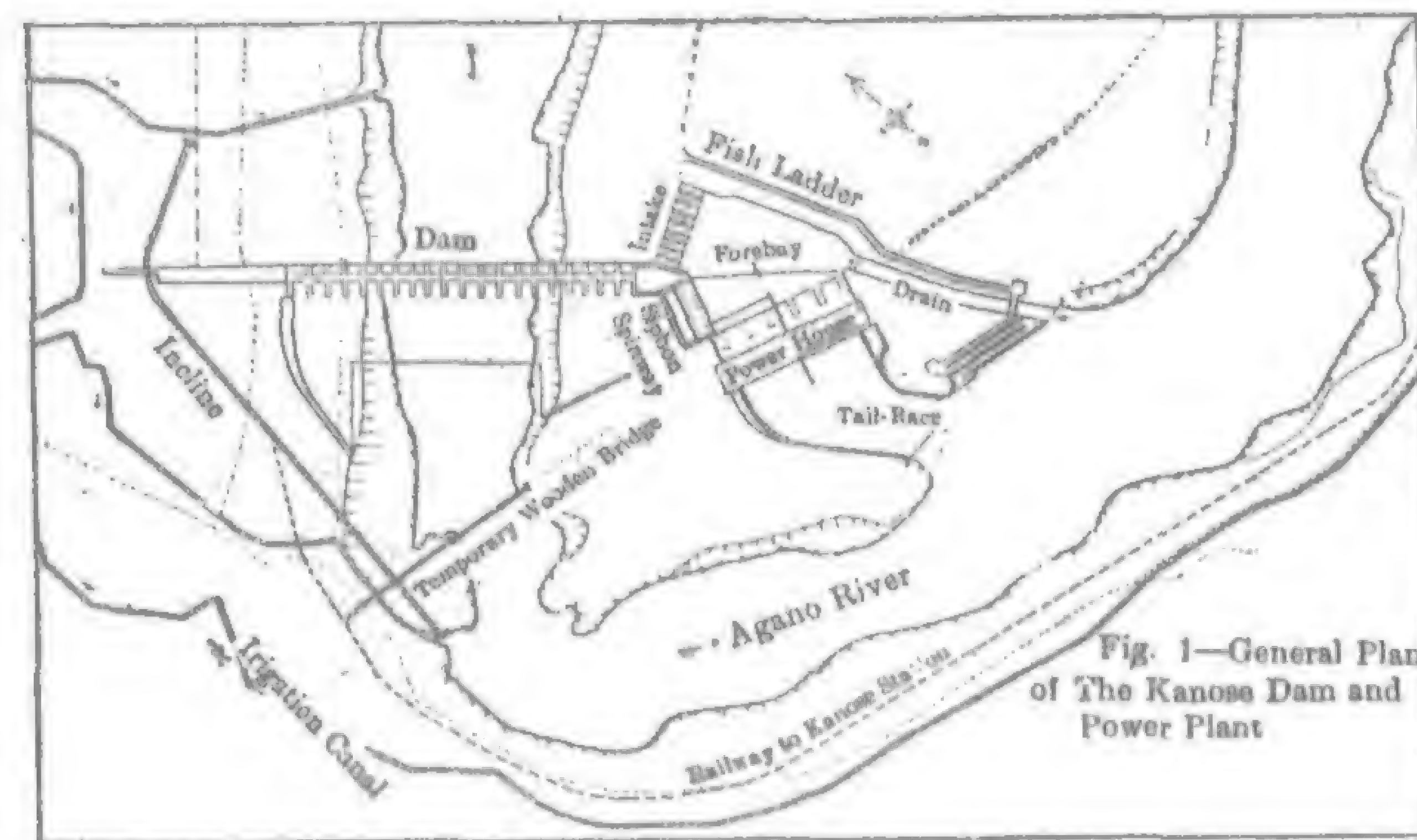


Fig. 1—General Plan of The Kanose Dam and Power Plant

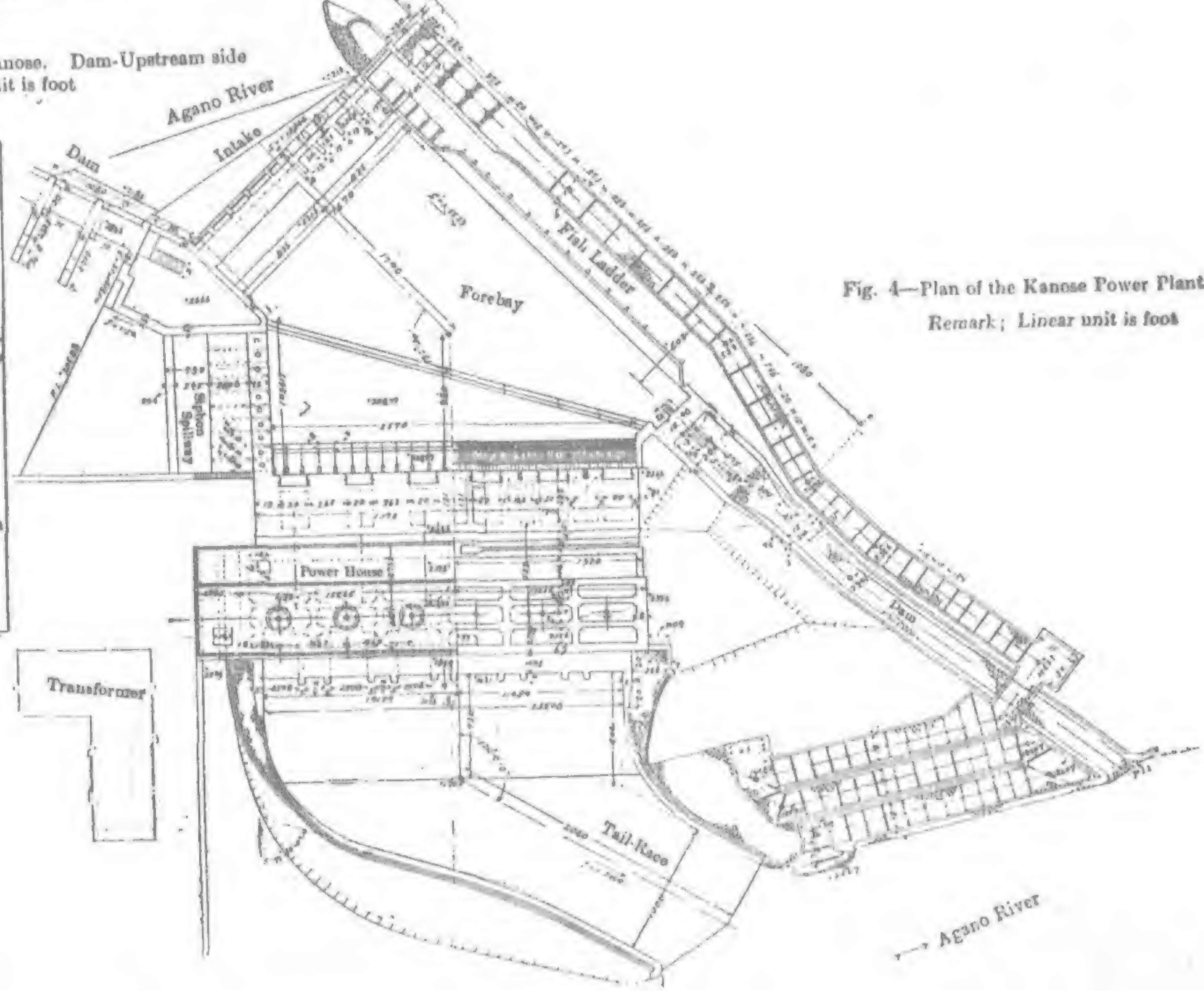


Fig. 4—Plan of the Kanose Power Plant
Remark; Linear unit is foot

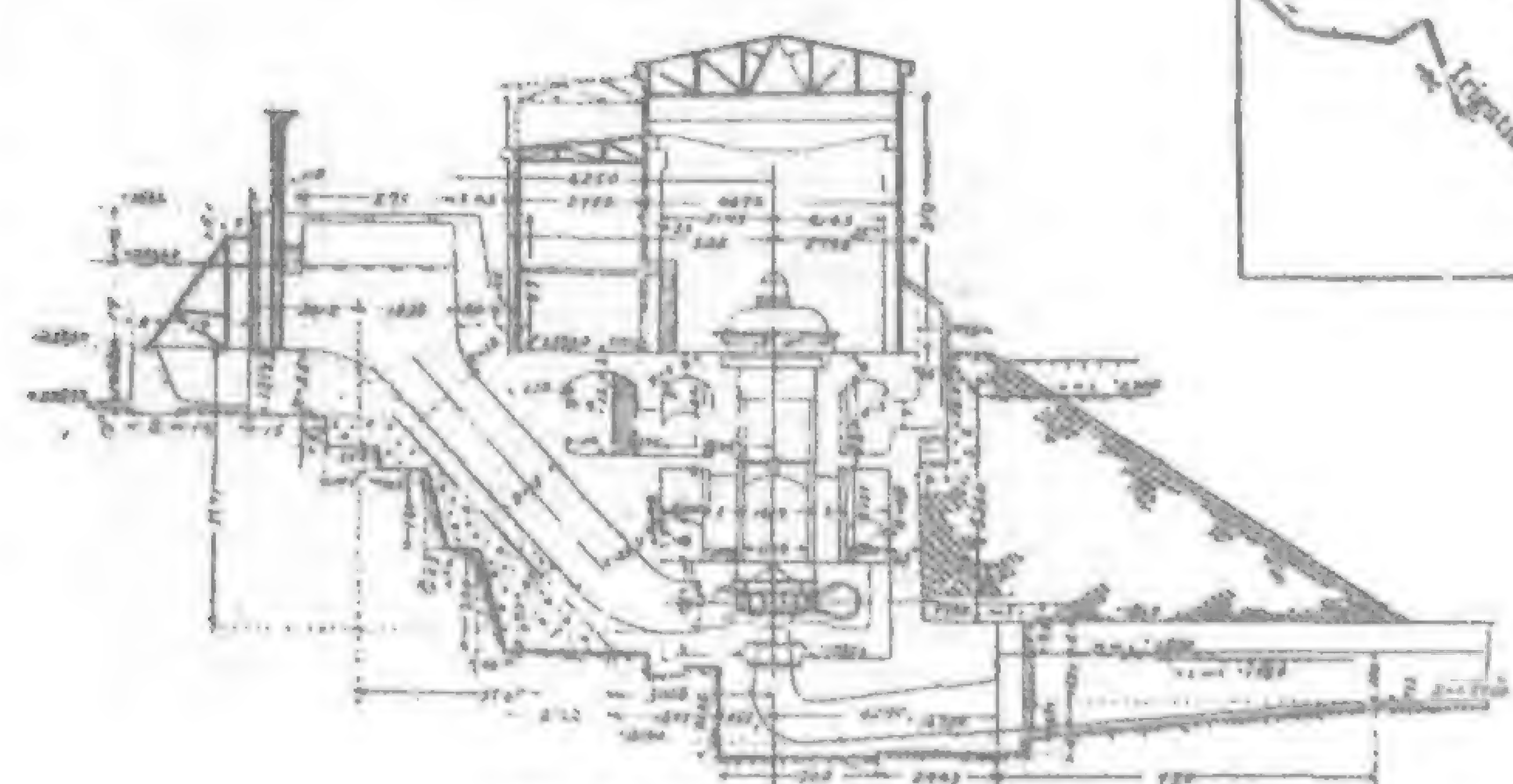


Fig. 5—Cross Section of the Kanose Power Station
Remark; Linear unit is foot

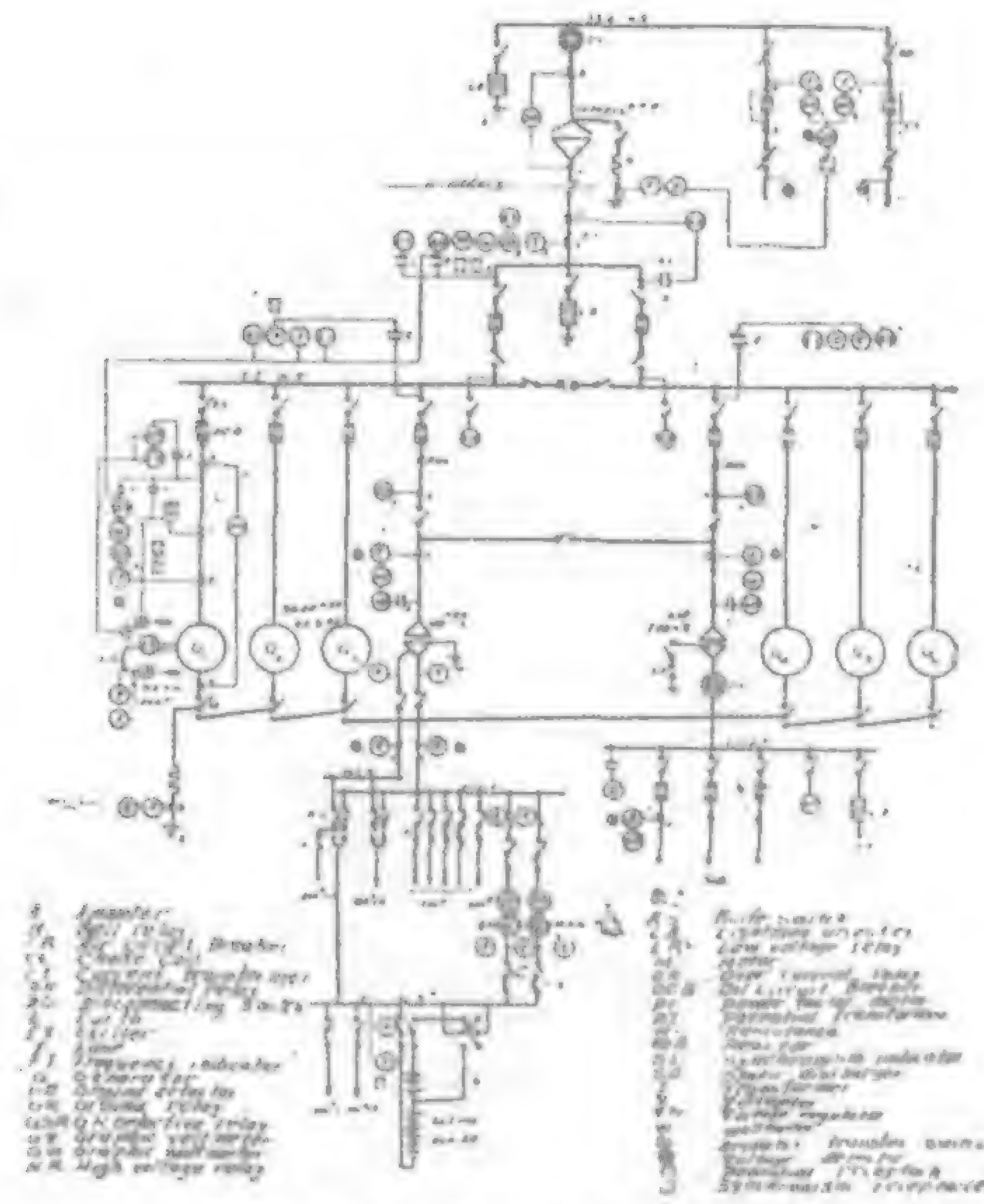


Fig. 7—Skeleton Connection Diagram of Kanose Power Station.

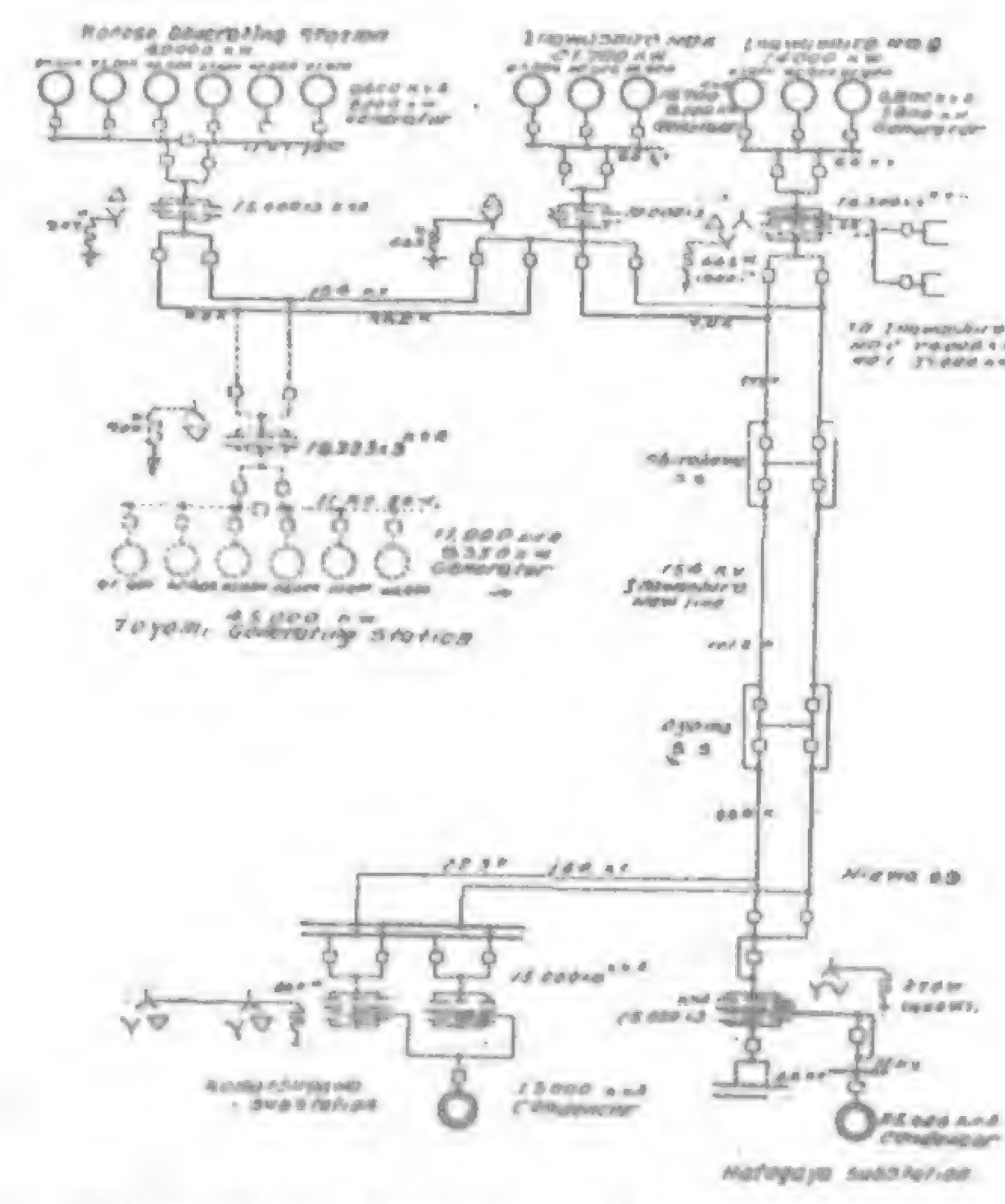
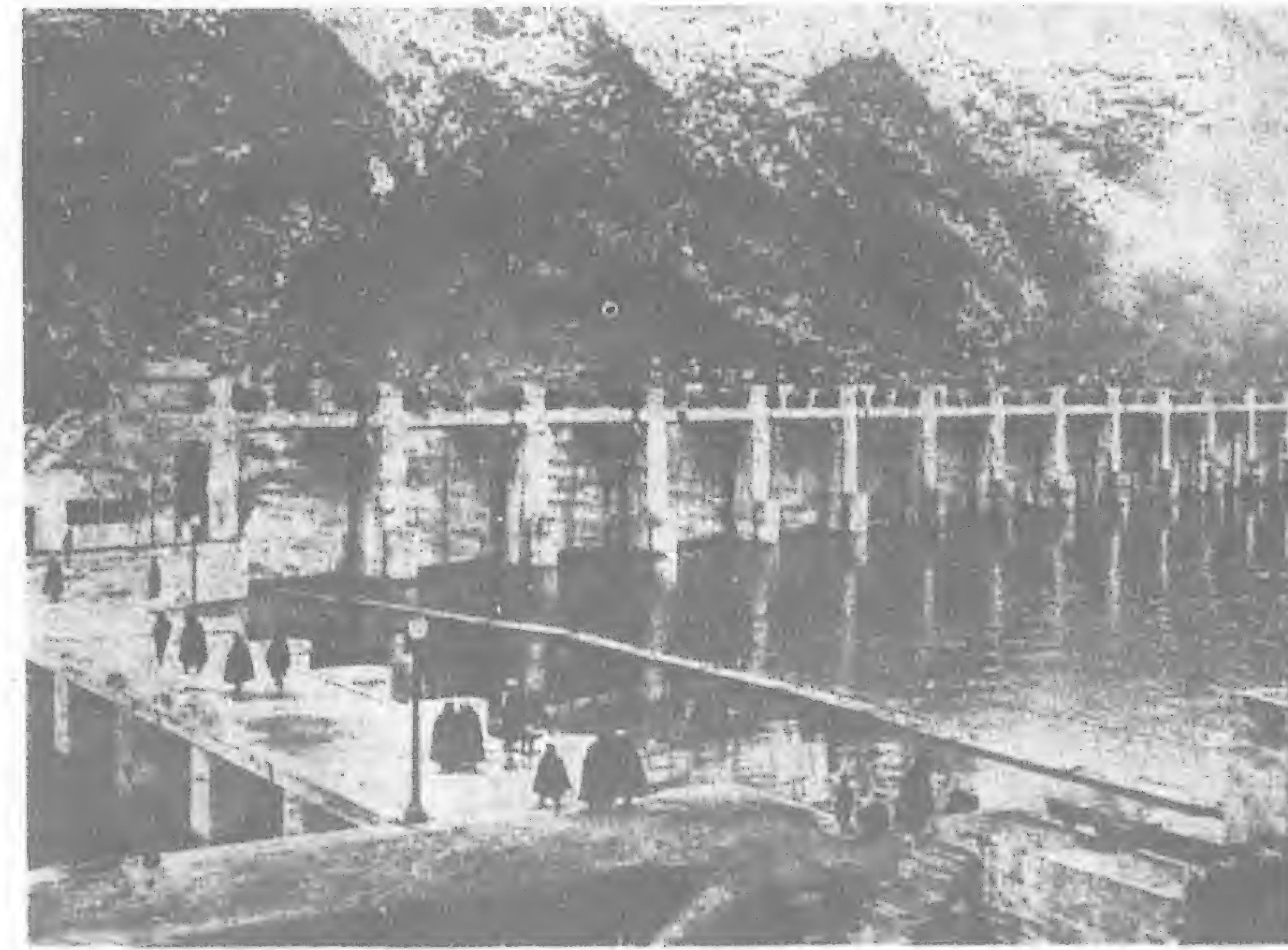


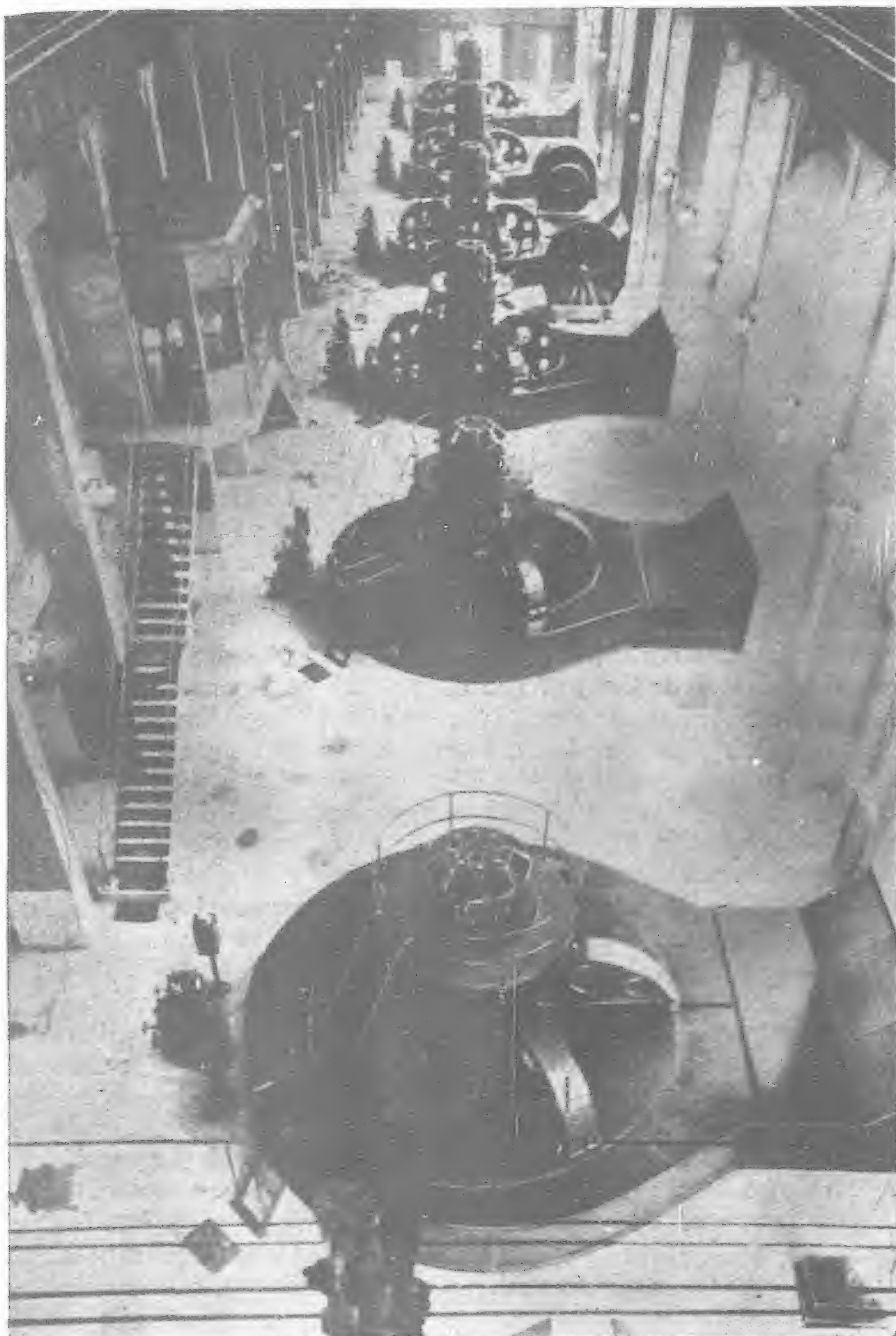
Fig. 6—Major Connections of the Inawashiro New Line System



Beneath the Generators and Above the Water Wheels, the Shafts Reach Down Some 50 feet



Dam and Intake



The Generator Room Approximately 300 Feet Long with the Six G-E 9,000-kV-A. Generators

Dam (See Fig. 2 and 3).—At the site of the dam, the geological formation was studied with care and core borings drilled at various points below the rock ledge to depths varying 8-ft.-50-ft. all indicated hard quartz trachyte. The river bed proper was of quartz trachyte; the left bank of the river below the reservoir level was also of quartz trachyte and above the level, it consisted of earth, gravel or hard clay; and the right bank from the surface ground to the depth of 10-ft.-35-ft. below the reservoir level was of impervious clay and the rest below it was also of quartz trachyte. These results gave assurance that the site was suitable and proper for masonry dam construction.

The dam is of solid concrete masonry construction designed as a gravity section. Its total length of 998-ft. consists of 714-ft. of gate controlled spillway section and 284-ft. of bulkhead section. In its design seismic conditions were taken into consideration assuming the horizontal acceleration as 1,000 mm/sec./sec. and the vertical acceleration as 500 mm/sec./sec. It was also assumed that water uplift at the heel of the dam is 35 per cent. of the water head and gradually decreases until zero at the toe. To collect seepage water under the dam and prevent excessive uplift, vertical holes of 3-in. dia. alternately located at 20-ft. and 16-ft. distances were placed along the line of 17.23-ft. downstream from the face of the dam and these holes are interconnected horizontally by means of 6-in. porous earthenware pipes and again these pipes in turn are tapped off crosswise at the middle of each section by a 7-in. dia. clay pipe which extends to the toe of the dam. Against seepage through the foundations a cut-off trench was built longitudinally at the upstream side of the dam and grout holes of 3-in. dia. spaced 12-ft. apart were drilled to the depth of 10-30-ft. and grouted under 30-100-lbs. pressure, and then the trench was concreted. In the same manner the toe and apron were finished.

20 Taintor movable crest gates, 30-ft. by 32-ft. in dimensions, probably the largest of their kind in the world are installed, three of which are equipped with automatic operating mechanism. The gate piers of 6-ft. thick by 60-ft. high are built of reinforced concrete supporting a 20-ft. wide reinforced concrete bridge, upon which the operating mechanisms for the gates are mounted and also on these piers are imbedded the shafts for the gates. The operating mechanism consists of long chain links, geared mechanism either hand or electrically operated and the electric motors (50 H.P. each) are controlled from the Switch Board. As an auxiliary for emergency use, two 50 H.P. portable gasoline engines and a railway track are provided.

When all twenty gates are fully opened, 320,000 cu. ft./sec. of water can be discharged while the existing record of the greatest flood ever known in the past history is 280,000 cu. ft./sec., thus showing the ample capacity of the gate capacity to meet any emergency.

The bulkhead sections are excavated until quartz trachyte formation is reached and upon them is built a concrete of trapezoidal section to the height of 266.6-ft. level or 10-ft. above the normal reservoir level and then both sides are filled and packed solidly with clay to prevent leakage.

Intake, Forebay and Headworks (See Fig. 4 and 5).—The intake is located on the left side of the dam and is built of reinforced concrete. The nine sluice gates of 15-ft. span are each provided with piers of 4-ft. wide. These piers support a reinforced concrete bridge and in front of the piers are installed I-beam trash racks to guard against floating logs, debris, etc.; besides, booms are stretched further upstream to deflect the course of floating obstacles. Against sand precaution is taken by having the elevation of the intake sill 10-ft. higher than that of the dam's fixed crest; that is 226.6-ft. + 10-ft. = 236.6-ft. elevation.

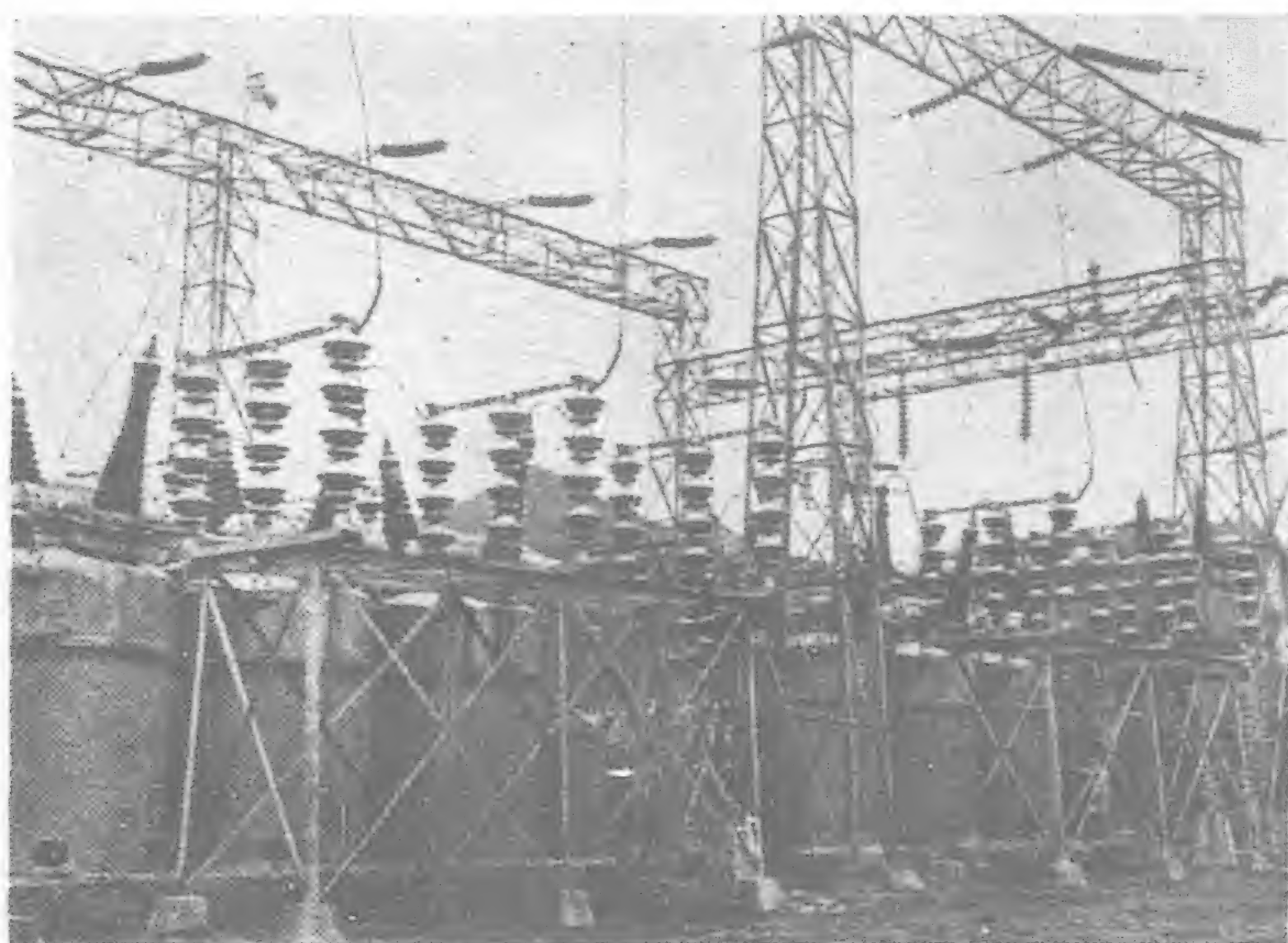
Unlike other similar types of installations in Japan, where a forebay is usually small and some length of canal is adopted, it is the special feature of this plant that a sufficiently large forebay without a canal has been provided to obtain the best water regulation under all conditions of load. For the collection of sand in the forebay, a submerged dam of 8-ft. high is erected at right angles to the current, and at the extreme left end of it a drain channel is connected by means of two sliding wooden gates, hand operated, to discharge from time to time the accumulated sand and gravel to the lower stream. At the right side of the forebay are 10 syphons capable of discharging 3,500 cu. ft./sec. of water each inlet or throat having the dimensions 8-ft. wide by 1.5-ft. high.

There are 6 stony type roller bearing gates, 20-ft. wide by 20-ft. high, either hand operated or motor driven from the switch board, rack and pinion mechanism being used for the operation of the gate. Screens are placed on the front of each gate to bar against leaves, debris, etc. and as a precautionary measure a boom is stretched further upstream across the entire length of the gates.

Power House and Tail Race.—The power house is a three story, steel girdered, concrete structure, designed to support all the superimposed weights of heavy machinery. It is 308-ft. long by 77-ft. wide, by 51-ft. high from the generator floor. On account of high flood record it was necessary to have the distance of about



Along the Top of the Dam Well Lighted by Modern Ornamental Units



Outdoor Substation with Transformers Built by the Shibaura Engineering Works

50-ft. between the generator floor and turbine center line and also a strong wall to withstand the lateral water pressure on the tail race side. For these reasons, the columns, arches, and walls are built extra strong. An elevator is installed to operate between different floors.

The draft tube has the dimension of 25.08-ft. wide by 11.22-ft. high at the outlet and the bottom elevation of the tube is 35.95-ft. from the turbine floor.

The tail race is an open canal of side concrete work and its dimensions are 256.08-ft. wide (max), 100-ft. wide (min.), and 16-ft. high.

Fish Ladder and Incline for Rafts (See Fig. 1, 4 and 5).—The most elaborate fish ladder or fishway is built to meet the strict requirements of the Fishery Department of the Imperial Government. Its total developed length is 1,320-ft.; 18-ft. wide, with a grade of 1:15 or less. It starts on the left side of the intake, skirting around the forebay, power house and tail race and ends a few feet downstream where the tail race meets the main stream. Beginning from the upstream end, two wooden sliding gates of 10-ft. wide by 9-ft. high, hand operated, control the water passage. To take care of the fluctuation of the reservoir level and at same time, to break the fall and to facilitate the passage of fish, there are installed immediately back of the entrance gates two rows of flap gates hinged at the bottom (three in row) and their angles of inclination can be adjusted by a drum hoist. The trough is interspersed with good sized pools, where every provision is made to make them as natural as any river beds. Reinforced concrete baffle boards, 3-ft. high by 1-ft. thick are placed at every 15-ft. and these are provided, alternating from side to side, with orifices 24-ft. wide by 1-ft. high and with rectangular notches, 4-ft. wide and 0.5-ft. deep, so that the fish may pass through compartment to compartment or over the boards, according to their habit. On both sides of each compartment, a semi-circle pocket 2-ft. radius and 0.6-ft. deep is supplied as a resting place. Furthermore, rocks and brush wood are placed on the bottom of every compartment to complete the care and comfort of the fish. To lead the fish to the fish ladder, wire screens of five rows, instead of guide dams, are planted across the main stream near the entrance and also adjacent to the tail race, and these screens are electrically charged just high enough to shock the fish.

Logs, boats and other objects are hauled over the dam by means of a steel truck that operates on a track of 9-ft. 3-in. gauge built on the right hand side bulkhead section. The truck is 16-ft. wide by 60-ft. long and is drawn between the two water levels by a cable, driven by a 150 H.P. electric motor. Loading and unloading is a simple matter—mere submersion of the truck to proper depth.

Construction Equipment.—All the construction materials and machinery parts were carried over a short branch railway of 2.8 miles, built specially for this purpose, between the dam site and the Kanose Railway Station of the Banyetsu West Line of the Imperial Government Railways. At the dam's end, a wooden truss bridge of 200-ft. span connected the railway to the power station and all the hydraulic and electrical machines were transported over this

bridge. A 6-ton cable way, stretched across the river, over the dam site, was installed for haulage and construction purposes. Electrical energy of 1,000 kW. at 3,300 V. transmitted from the Tsugawa substation of Niigata Electric Power Co. was supplied for all power purposes.

River Diversion and Construction Methods.—A progress schedule was carefully planned with a view of commencing operation on December 1, 1928, and in spite of a few setbacks encountered due to high floods, the work was successfully completed within the contemplated time.

In the low water season of 1926, a double-lined crib coffer dam was constructed from the right side of the proposed dam site enclosing an area of 300-ft. long by 120-ft. wide, and to assure an enclosure perfectly water tight, a concrete wall 6-ft. wide was added just inside the crib coffer dam. Then the work for the dam's foundations and apron within this area was carried on with the utmost speed. When these parts were completed, 5 diversion sluices, one of 20 ft. wide by 25-ft. high and four of 12-ft. wide by 25-ft. high, were constructed and finished. One sluice of larger size was intended for the log passage.

During the early Summer of 1927, the crosswise section (right angle to the river flow) of the coffer dam and concrete wall was removed and the water was led through the sluices above mentioned. The remaining or longitudinal section was left untouched, to be used in conjunction with the construction of the remaining part of the dam. Thus the right hand section of the dam, piers, etc. were completed in the Autumn of 1927.

On the upstream side, from the remaining longitudinal concrete wall, a double-lined crib coffer dam was constructed and extended to the left shore and also a single-lined crib coffer dam on the downstream side.

The dam procedure was followed as with the right hand section. A concrete wall of 9-ft. wide was constructed by the wooden box sinking method, to guard against possible seepage of water through the crib-dam.

During the Winter of 1927, when water was low, the dam's foundations and apron were nearly completed and the remaining parts of the dam, piers, etc. were finished in the Autumn of 1928. Final closure of the sluices was successfully carried out in the Autumn of 1928. The gates were provided with roller bearings and slid into their places without a single mishap, so smooth and successful was the operation.

The installation of the 20 Taintor gates and mechanisms kept pace with the progress of the dam construction and was completed in a most gratifying manner.

The following quantities were involved in the construction of the dam and power house—

Rock excavation, including tailrace	..	70,000 cu. tsubo*
Concrete	..	35,000 "
Structural steel	..	1,600 Tons
Reinforcing steel	..	1,200 "
Hydraulic and Electric machinery	..	5,700 "

Electrical Features.—Two generating stations and two step-up substations are involved in delivering the electric energy from the Aganogawa Development into Tokyo district:

- The Kanose Hydro-electric Generating Station and the Aganogawa No. 1 Step-up Substation, delivering 40,000 K.W. normal.
- The Toyomi Hydro-electric Generating Station and the Aganogawa No. 2 Step-up Substation, now under construction, delivering 45,000 k.W. normal.

The electrical features of these generating stations and substations have much in common. The high tensions mains of the two plants are connected to the Tokyo Dentô K. K.'s new Inawashiro 154 k.V. Transmission Line in parallel with the Inawashiro No. 1, No. 2, No. 3 and No. 4 Power Stations and at the receiving end of the line in Tokyo, the Hatogaya, Hanabata and Kameido Substations are connected as shown in Fig. 6, the present installation being shown solid and the future dotted.

Kanose Generating Station and Aganogawa No. 1 Substation.

Fig. 5 is a cross section and Fig. 4 a plan of the power station.

The initial development of Kanose provides for six 12,500 H.P. water turbines, six 9,400 k.V.A. generators, one unit being spare, and two 154 k.V. transmission circuits.

*1 cu. tsubo=7.8619 cu. yds.

Prime Mover.—The vertical Fransis water turbines designed and made by Escher Wyss Co., Switzerland, are of the single type, spiral casing, 12,500 H.P. at full gate opening, 1,640 cub. ft./sec. quantity of water, 74-ft. net head, 150 rev. per min.

Owing to the relatively long distance required between the generator floor and turbine center line due to the high flood level approximately 50-ft. being that distance, the shafting consists of a turbine shaft and an intermediate shaft, and an additional guide bearing is installed to keep the intermediate shaft in alignment.

Oil Pressure Speed Governor.—Each turbine is provided with an automatic oil pressure speed governor of Escher Wyss design and make, whose servomotors are arranged in the turbine room and actuator on the generator floor.

The two servomotors are of the double acting type and are located near the turbine casing.

For the actuators on the generator floor, the newest model of operating type 1925 has been installed with special no-load return mechanism and damping device as well as single central-spring pendulum.

This governor is guaranteed to operate the gate over a full range from 2 to $2\frac{1}{2}$ seconds and is sensitive to a speed variation $\frac{1}{4}$ of 1 per cent.

General Pressure Oil System.—To furnish the necessary pressure oil, the installation is supplied with three sets of separate gear pumps, oil tanks, and air chambers, one set being a spare; two oil pumps are so arranged that they can be driven singly by a horizontal spiral casing and propeller runner type water turbine or by two electric motors, and the third, electrically only.

Each pump is able to furnish sufficient pressure oil for the simultaneous regulation of three turbine units.

For this purpose, also air chambers and oil tanks are interconnected with one another but can be made to operate entirely independently of one another by closing the stop valves.

11-k.V. and 154-k.V. Lay-Out.—Fig. 7 is the skeleton connection diagram of the Kanose Power Plant.

The 9,400 k.V.A. main units generate energy at 11,000 volts and step-up to 154,000 volts through 45,000 k.V.A. transformers.

Three generators are tied together to a generator bus and two generator buses are connected by oil switches without reactor.

There are two feeders, each connected to separate sections of 11-k.V. bus to supply station service transformer banks, and provision for two other local feeders.

Main Generators and Exciters.—The main generators are rated 9,400 k.V.A., 8,000 kW., 85 per cent. power factor, 11,000 volts, 40 poles, three phase, 50 cycles, 150 R.P.M. Directly-connected, above the spring thrust bearing, is a 90-kW., 250 volts, 8 poles, 150 rev. per min. compound wound exciter to operate with voltage regulator.

The neutrals of main generators are brought out and grounded through an 8.6 ohm resistor common to all of the units. Six temperature resistors are provided in the main machine.

The generators are roughly, 22-ft. in diameter, 14-ft. high, and weigh complete well over 140 tons.

Main Transformer Bank.—The main transformer bank is of 45,000 K.V.A. capacity, consisting of four 15,000 k.V.A. water cooled units, one as a spare.

They are Y-connected on the 154-k.V. side, with grounded neutral through a 907-ohm resistor, and have 97.6-95.3-90.7 k.V. taps in this winding. The 11-k.V. side is delta connected.

They were manufactured by the Shibaura Engineering Works.

Oil Circuit Breakers.—The oil circuit breakers for 154,000 volts service are rated 154 k.V. 800 ampere, 5,500 amp. rupturing capacity. Current transformers are attached to the bushing for the use of relay protections and instruments.

These were manufactured by the Shibaura Engineering Works.

The 11-k.V. breakers have a rupturing capacity of 60,000 amp. at 15 k.V.

The station service breakers are of 600 ampere capacity, the generators of 1,200 amp. and the bus ties of 3,000 amp. capacity.

They are solenoid operated.

Relays.—All relays, meters and switch boards were supplied by the General Electric Co. U.S.A. except as shown.

The main generators have percentage differential relays which take care of phase-to-phase and phase-to-ground faults.

Over-voltage relays protect against excessive voltage that may occur upon sudden loss of load.

Under-voltage relays protect against the over-load of the machine that may occur upon sudden short circuit of the generator bus.

The main transformers are equipped with a differential relay which protects against internal faults, and with a low energy grounded relay.

The 11-k.V. bus sections are protected by induction type inverse time over current relays and low-energy ground relay.

Two additional over-load relays provide protection against a 154 k.V. bus failure between phases and two 154 k.V. lines phase-to-phase failures.

Two 154 k.V. lines are also protected by:

- A. One "IR-30" induction wattmeter type sensitive ground selective relay.
- B. One "IO-24" induction type time limit over-current relay.
- C. Two "EQ-10" plunger type instantaneous opening time delay closing auxiliary relay.

These three relays were furnished by the Shibaura Engineering Works.

Potential element shunted by several ohm resistor of (A) relay is in series with the secondary of the current transformer of the neutral grounding circuit.

Current element of (A) relay is connected to both ends of the differentially connected current transformers of two lines and in series with over current relay (B).

Two auxiliary relays (C) are selectively connected in series with the contact of (A) relay and that of (B) relay.

Station Auxiliary System.—This may be divided into two parts: First, that to supply the essential auxiliaries of each main unit which are three governor oil pumps, two air compressor sets, two drainage water pumps and two cooling water pumps; and to supply the general station services such as two motor generator sets for battery-charging and station lighting. The energy is obtained from three 100 k.V.A. single phase, 11,000/105-210 volt transformers. The lighting is obtained from the 105-volt bus of the transformers and in the event of failure of the a.c. supply three lighting circuits are automatically connected to a storage battery by a throw-over switch.

Second, that to feed the out-door gate motors, the incline motor and the general out-door lighting. The power is obtained from three 100 k.V.A. single phase, 11,000/3,300 volt transformers.

There are twenty taintor gate motors (400 V. 50 H.P. capacity), six stoney gate motors (200 V. 20 H.P. capacity) and two sluice gate motors (200 V. 25 H.P. capacity). Twenty taintor gate motors are divided into three groups.

Each group is provided with a step-down transformer bank, three 50 k.V.A. single phase, 3,300/400 volt transformers.

All taintor gates and stoney gates are respectively controlled by both a local switch and a remote control switch in the switch board room and provided with a gate position indicator in the switch board room.

One group of gates No. 9, No. 10 and No. 11 is automatically controlled by electrical devices.

The automatic control of the taintor gates is based on the principle that the higher the water level should rise, the more the gate must be opened, the maximum difference of water level available for regulation being 1 meter. If then the level is at 0.5 meter the gates must be 50 per cent. opened, the total opening being 35-ft. = 10.7 meter.

Multi-core rubber-insulation lead-covered cables are used for controlling, indicating and lighting circuits.

Three-core paper-insulation lead-covered steel-armored cables are used for 3,300-volt power circuits and 200-volt, 400-volt motor feeders.

These water proof cables are laid along in the concrete ducts and spaced regularly by wooden-cleats. All concrete ducts are covered with checkered plates.

(ABSTRACT)

Located

at Aza Tsunogami, Kanose-mura, Higashi-Kanbara-gun, Niigata prefecture, Japan. 2.8 miles from Kanose Station, Banyetsu West Line, Imperial Government Railway.

Owned and operated

by the Toshin Denki K.K. (Toshin Electric Co., Ltd.).

Power generated

delivered to the Tokyo Dento K.K. (Tokyo Electric Light Co., Ltd.).

Drainage area	2,400 sq. miles.
Total storage water quantity ..	120,000,000 cu. ft.
Total available	60,000,000 cu. ft.
Effective head	74 ft.
Effective Discharge, maximum ..	8,000 cu. ft./sec.
Theoretical Horse Power	67,300 H.P.
Output in kW.	40,000 kW.

Daily Effective discharge as follows :—

based upon the record of the Hydrographic report that the minimum discharge in the dry season is 4000 cu. ft./sec. and that by the fluctuation of 4-ft. head on the Reservoir level at 74-ft. effective head.

For 20 hours	3,200 cu. ft./sec.
" 4 "	8,000 cu. ft./sec.
Work begun	September 1926
Work completed	November 1928

Time of Completion

2 years 3 months—Record time in Japan.
Regular Operation begun December 1928

Dam—

built across the Agano River at Aza Tsunogami, Kanose-mura few hundred feet above where the river bends, gravity section ; concrete masonry construction.

Length consists of

Gate controlled spillway section	714-ft.
Bulk head	284 "
Total	998 "

Forebay, Power House and Tailrace, located on the left hand side of the dam, on land with rock foundations.

Tainter Gate.. .. . 20

Dimension—30-ft. wide by 32-ft. high (probably the largest in the world)

Gate Pier

Re-enforced concrete construction
Dimension—6-ft., thick by 60-ft. high above the fixed spillway crest ; these piers support a re-enforced concrete bridge.

Intake

15-ft. span sluices 9
Equipped with I-beam trash racks and stop log grooves on the piers.

Forebay—

Capacity 1,426,000 cu. ft.
Area 52,800 sq. ft.
Equipped with one drain channel and syphon spillway.

Head Gate 6

Dimension—20-ft. wide by 20-ft. high ; stony type ; roller bearing ; rock and pinion for hoisting.
Equipped with trash racks and stop log grooves.

Power House,—

3 story, steel girdered ; concrete structure, 308-ft. long, 77-ft. wide, and 51-ft. high.

Main Turbine

Vertical, type Francis, single spiral, single discharge 12,500 HP. 150 R.P.M. Maker—Escher Wyss Co. Switzerland.

Main generator 6

A.T.B.—40-9400 kV.A. .85 P.F. 11,000 V. 150 R.P.M. 50 cycle. Maker—General Electric Co. U.S.A.

Switch Board

Switch Board-Bench Type
Maker—General Electric Co. U.S.A.

Fish Ladder—

Developed length 1320-ft.; 18-ft. wide ; the most elaborate one in Japan.
Located on the left side of the forbay, power house and tailrace.

Log Incline

Electrically driven cable truck 16-ft. wide by 60-ft. long operated upon 9-ft. 3-in. gauge track.
Located on the right hand side of the dam, partly on the bulk head section.
The following quantities involved in the construction of the

dam and power house,—

Rock excavation, including tailrace..	70,000 cu. tsubo
Concrete	35,000 cu. tsubo
Structural steel	1,600 tons
Re-enforcing steel	1,200 "
Hydraulic and electric machinery ..	5,700 "
1 cu. tsubo=7.8619 cu. yds.	

THE TOYOMI HYDRO ELECTRIC DEVELOPMENT ON THE AGANO RIVER, JAPAN.

(ABSTRACT)

Located

at Aza Toyoda, Toyomi-mura, Higashikanbara-gun, Niigata, prefecture, Japan. 2.3 miles from Toyomi Station, Banyetsu West Line, Imperial Government Railway.

Owned and operated

by the Toshin Denki K.K. (Toshin Electric Co., Ltd).

Power generated

delivered to the Tokyo Dento K.K. (Tokoyo Electric Light Co., Ltd.).

Drainage Area	2,400 sq. miles
Total Storage water quantity ..	120,000,000 cub. ft.
Total available	60,000,000 cub. ft.
Effective Head	82 ft.
Effective discharge, maximum ..	8,000 cub. ft./sec.
Theoretical Horse Power	72,820 HP.
Output in kW.	45,000 kW.

Daily effective discharge as follows :—

based upon the record of the Hydrographic report that the minimum discharge in the dry season is 3,900 cub. ft./sec. and that by the fluctuation of 4.5 feet head on the reservoir level at 82 feet effective head.

For 20 hours	3,200 cub. ft./sec.
" 4 "	8,000 " " "
Work begun	June 1927
Work shall complete	November 1929
Time of completion	2 years 5 months
Regular operation is to begin ..	December 1929

Dam—

built across the Agano river at Aza Toyoda, Toyomi-mura, a few hundred feet down where the river bends.

Gravity section ; concrete masonry construction. Length is 678 feet.

Forebay, Power House and Tailrace, located on the left hand side of the dam, on land with rock foundations.

Tainter Gate.. .. . 19

Dimensions 30-ft. wide by 32-ft. high (probably the largest in the world).

Gate pier

Reinforced concrete construction.
Dimensions—6-ft. thick by 63-ft. high above the fixed spillway crest ; These piers support a reinforced concrete bridge.

Intake

15 feet span sluices 6
Equipped with I-beam trash racks and stop log grooves on the piers.

Forebay

Capacity 1,599,000 cub. ft.
Area 53,317 sq. ft.
Equipped with one drain channel and syphon spillway.

Head Gate 6

Dimension 24-ft. wide by 22-ft. high ;
Sector Type ;
Equipped with trash racks and stop log grooves.

Power House,—

2 story, steel girdered ; concrete structure, 308-ft. long, 77-ft. wide, and 58-ft. high.

Main Turbine

Vertical, type Francis, single spiral, single discharge, 14,000 HP. 150 R.P.M. Maker—Hitachi MFG. Co. Japan.

Main Generator	6
A.T.B.—40—11,000 kV.A. .85 p.f. 11,000 V. 150 R.P.M. 50 cycle.	
Maker—Hitachi MFG. Co., Ltd. Japan.	
Switch board	
Switch board—Bench type	
Maker—Hitachi MFG. Co. Japan.	
Fish Ladder—	
Developed length 1,800 feet ;	
18-ft. wide ;	
The most elaborate one in Japan.	
located on the right hand side of the forebay, and power house	
Log incline	
Electrically driven cable truck 16-ft. wide, 57-ft. long, operated upon 9-ft.-3-in. gauge track, located on the left hand side of the forebay.	
The following quantities involved in the construction of the dam and power house.—	
Rock excavation, including	
tailrace 101,400 cub. tsubo=797,200 cub. yds.	
Concrete 41,500 „ „ =326,300 „ „	
Structural steel 500 tons	
Reinforcing steel 2,000 „	
Hydraulic and electric machinery 5,500 „	

Tunnelling in Japan

THE near completion of the Tanna Tunnel on the main Tokaido Railway line, described in the December number of *The Far Eastern Review*, invites attention to similar engineering problems now being tackled by the engineers of Japan. The most important of these is connected with the plan to provide direct rail communication between the Main Island and Kyushu by tunnelling under the Shimonoseki Strait. Several preliminary studies have been made by the Railway Engineers and estimates of cost drawn up. Two methods have been considered. The first is to drive through under the bed of the Strait. This is calculated to cost about Y.23,000,000. The second is to construct 200 feet sections of concrete tunnel above the surface and then sink them to the bottom, finally joining the series into one water-tight tunnel. This plan is estimated to cost about Y.32,000,000.

The most difficult problem confronting the engineers conducting the investigations, is the fact that the geological formation in the strait district is such as make the driving of a tunnel under the strait a most difficult problem. There appears to be a fault in the formation at this point and the underlying strata is considerably broken, irregular and of varying consistencies. With their experience in driving the Tanna Tunnel at Atami, the Japanese engineers are not anxious to invite a repetition of those difficulties, which resulted in many breaks and loss of lives, without anticipating and providing against these contingencies. The bottom of the Strait will require an immense amount of levelling work to prepare for sinking into place the concrete sections of the other type of tunnel, so it is believed that if the work is undertaken, the older method will be adopted.

What is perhaps the pride of Japanese tunnelling work, is expected to be completed by January 10, 1930. This is the Shimizu Tunnel, connecting the prefectures of Gumma and Niigata. The length of the tunnel is about six miles, the longest in the Orient and the seventh in the world.

Only about 830 feet remains to be bored, before the two construction gangs meet at the center of the tunnel. When everything is set for the last blast, Dr. Yoku Egi, Minister of Railways, will turn on the electric switch in his office in the Railway Department Building in Tokyo, connected to the tunnel about a hundred miles away, and explode the charge.

About 700 workers have been working in the tunnel for the last six years. The full cost is estimated at Y.40,000,000. Its completion in the seventh year is regarded as record speed in tunnel engineering.

The railway, it is expected, will run through the tunnel by September, 1931, and will considerably diminish the distance between Tokyo and Niigata.

The normal rate of excavation set by the Construction Bureau of the Railway Department is about nine feet a day. This rate has recently been greatly increased, each construction gang digging about 12 feet, by the inducement of higher wages.

Another important piece of engineering, recently completed, is the 11,253 feet, boring on the Sangu Tramway Line, known as the Aoyama Tunnel, penetrating the Iga-Ise border. This bore cost about Y.3,000,000. At first the rate of boring was about 20 feet a day but towards the end it averaged 30 to 40 feet.

P. S. Hopkins Head of American and Foreign Power Company Interests in China

(Continued from page 62).

being graduated from the Massachusetts Institute of Technology, one of the foremost technical colleges of the United States, with the degree of B.S. in Mining Engineering. After graduation he was interested in mining and oil production in various sections of the United States and Canada. He returned to China in 1915, with the Standard Oil Company of New York, and has been associated with that Company continuously since that date.

Mr. Hopkins has had a long and intimate acquaintance with China, gained through years of extensive travel and residence in the Provinces. As Chief Executive for the Standard Oil Company of New York in China, his control of that company has been characterized by an unwavering belief in the great future of China. This close sympathy with and confidence in the future of the country brings to the electrical industry, vision and understanding which should go far in advancing the economic development of China.

As part of his duties with the American and Foreign Power Company, Mr. Hopkins will become President of the Shanghai Power Company and Chairman of its Advisory Board. In accordance with a previous notice Mr. C. S. Taylor is Vice-President and General Manager of Shanghai Power Company in charge of its operation.

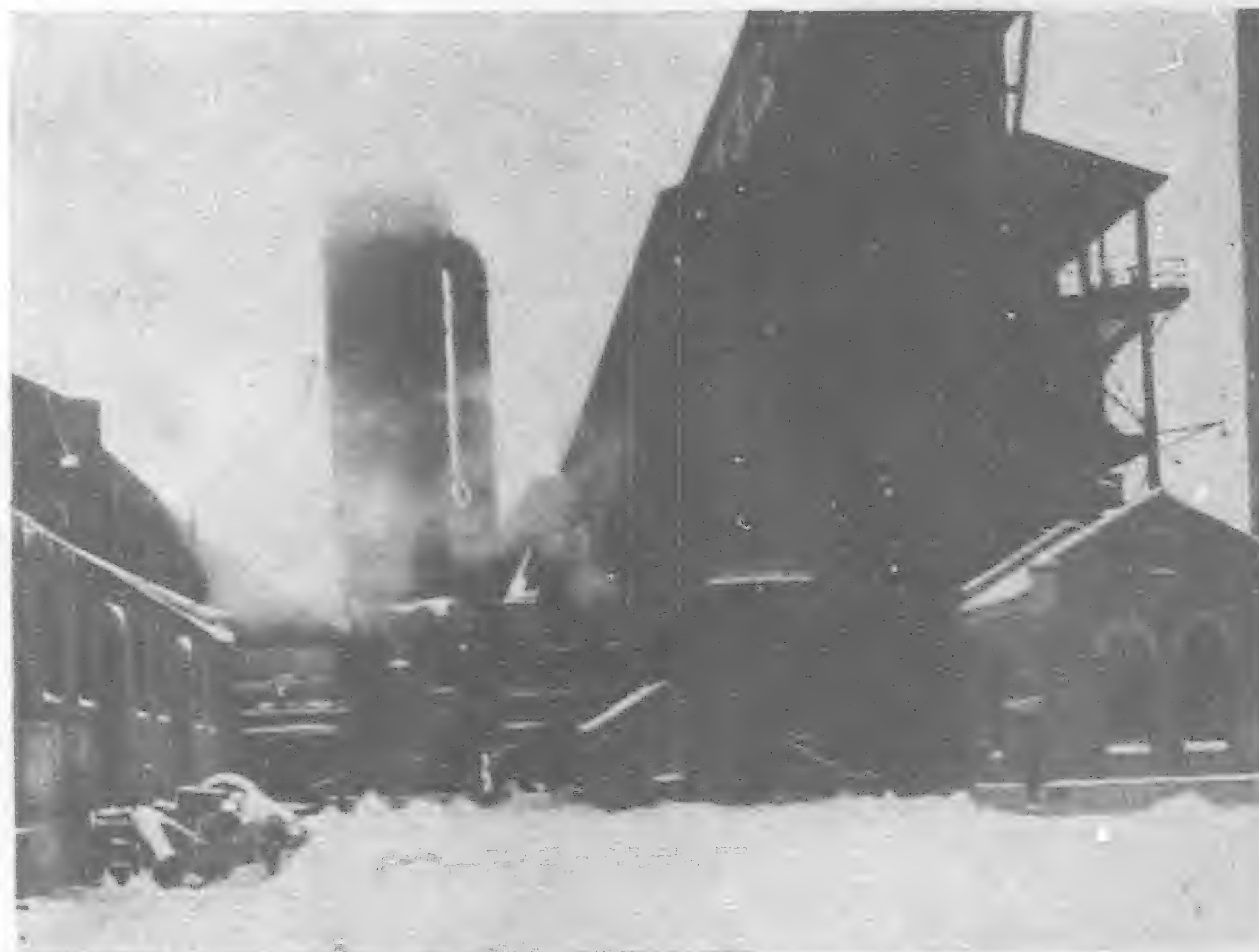
World's Largest Shale-Oil Plant

(Continued from page 68).

On December 30, 1929, the first portion of shale-oil was put out by the plant. Superintendent General T. Yamanishi of the Fushun Collieries immediately sent a telegram to Vice-President K. Ohdaira of the South Manchuria Railway Company commenting on the success of the new plant.

Much credit for the success of the Fushun Shale-Oil Plant goes to Rear Admiral T. Makino of the Imperial Japanese Navy, who joined the Company in 1923 to render his services in connection with the project. Admiral Makino recently said:

"The great oil manufacturing plant at Fushun is now a reality. Ten retorts were set to work on the night of December 30, 1929 and 10 more between the 5th and the 6th of January. From the 20 retorts the monthly output of 1,500 tons of crude oil may be obtained. It represents one-quarter of the entire producing capacity. Due to the delay of the complete installation of the accessories to the shale crushers, the new plant will not be fully operated until March or April."



Rear Section of Shale Retorts at New Shale Oil Plant at Fushun

Manila's Modernized Ice and Cold Storage Plant

WITH the advent of United States Government control in the Philippine Islands came the necessity of improved living standards. One of the first steps in this direction was the construction of a central ice and cold storage plant under the supervision of U.S. Army engineers. This installation, completed in the year 1900, consisted of three horizontal duplex ammonia compressors each of 40 tons ice or 68 tons refrigeration capacity. The compressors were direct connected to Corliss type vertical compound steam engines.

A decision by the Philippine Government to modernize this plant was reached after two years' exhaustive study by the government engineers and the officials of the Manila Electric Company, who finally agreed to finance the undertaking on the basis of the owners paying for the new equipment out of the savings effected in operating costs as compared with the running expenses of the old plant.

After thorough investigation three 13 and 9 by 14 Worthington two-stage ammonia compressors were selected and have recently been installed. They are connected to Westinghouse 250 h.p. synchronous motors. Each one is rated at 147.5 tons of refrigeration and is guaranteed to produce a ton of refrigeration per 28.2 kW. hours input when operating with 20 lbs. suction pressure and 185 lbs. discharge pressure.

These compressors embody many unique features which simplify their operation and maintenance. The use of Feather (Reg. U.S. Pat. Off.) valves insure quiet running and long life as these valves seat by contact rather than impact. Owing to their light weight and 100 per cent. area through the seat any liquid ammonia which might perchance be returned in suction lines is easily passed through the cylinders without damage to the machine. Clearance pockets are fitted to both the high and low pressure cylinders so that the units can be operated at reduced capacities of 125 tons and 100 tons without any appreciable sacrifice of efficiency. Between the high and low pressure cylinders of each compressor is installed an ammonia liquid intercooler. Beside the three main compressors a seven by seven single cylinder vertical Worthington belt driven unit has been installed as a pump out compressor.

In addition to the ammonia compressors Worthington also supplied three five inch ball bearing type centrifugal pumps for circulating the condenser cooling water. These pumps each deliver 1,110 gallons of water per minute against 60 feet head with an efficiency of 80 per cent. They have been installed to replace the original direct-acting steam pumps which have been in use for twenty-six years.

This plant produces 75 long tons of ice per day and the chemically pure water which must be used for this purpose is obtained from a Griscom-Russell triple effect evaporator and distiller. The raw water is raised from an artesian well by means of a 4½ by 10 inch single plunger well pump direct connected through gears to a 5 hp. Westinghouse motor. Thirty gallons per minute is raised from 100 feet below ground and discharged through the distiller tubes into a Worthington vertical open type feed water heater which is equipped with a two-pass filter. Here the water is raised from 125 to 210 degrees F. before being fed into the evaporators by an automatically controlled Worthington duplex steam pump.

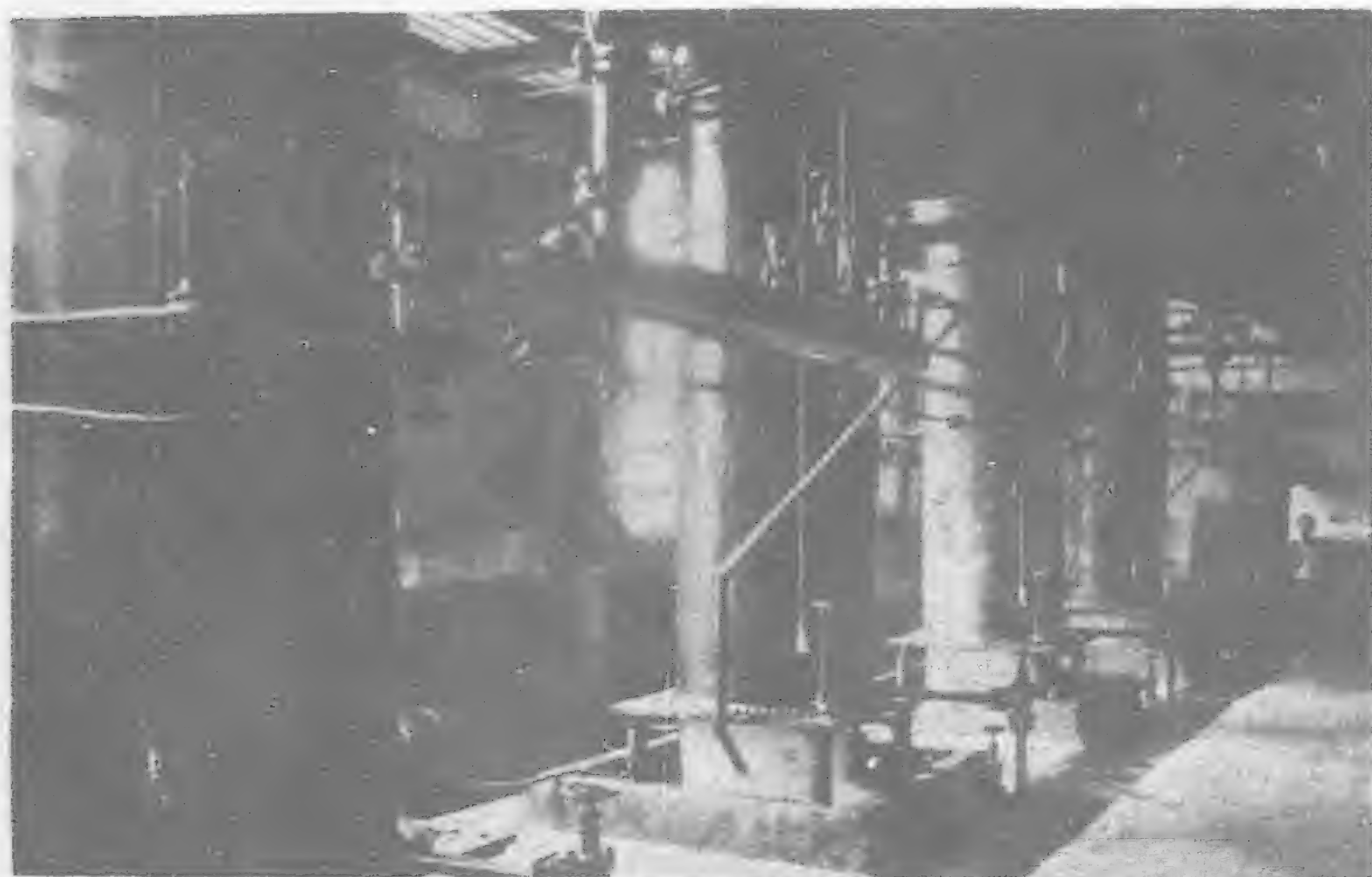
Another important feature which contributes greatly to the success of this plant is the battery of four Carbondale "Spira-Flo" ammonia condensers. The cold water discharged from the pumps

is admitted at the top periphery of the condensers and enters the tubes with a swirling motion which continues down through the tubes, thereby increasing the velocity of the water and consequently greatly improving the heat transmission. Each of these four condensers measures 45 inches inside diameter of shell by 11 feet 1½ in. in length and has a capacity of 125 tons refrigeration. In addition to the above the Carbondale Machine Company supplied the high side fittings consisting of intercoolers, compressor trimmings and suction strainers, while all of the ammonia low side piping and valves, as well as the water and steam piping were furnished by the Crane Company.

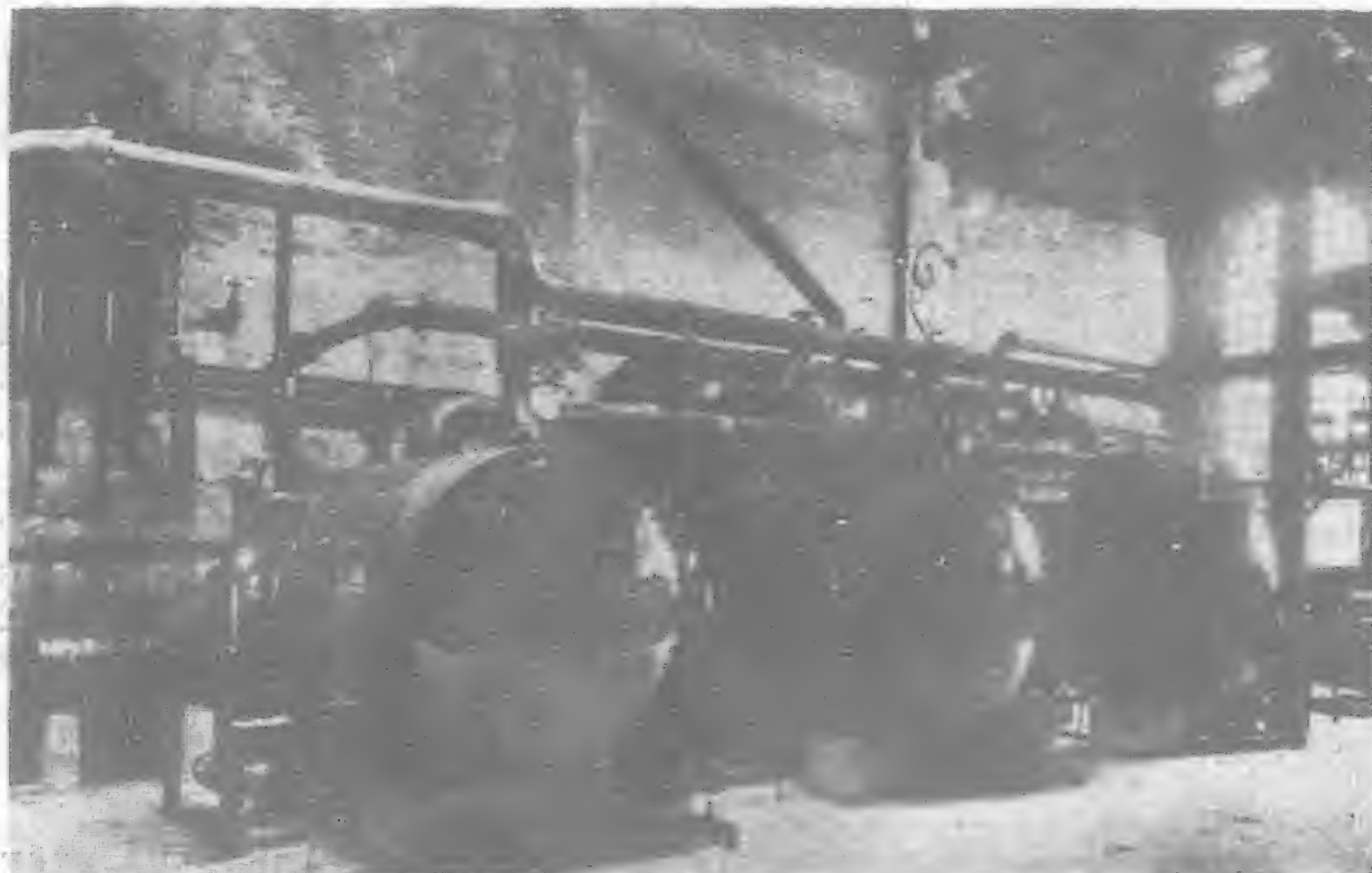
This plant, completely erected by The Edward J. Nell Company of Manila, produces 75 tons of ice per day and cools 791,000 cubic feet of storage space. It has already demonstrated a saving of \$3,500.00 per month, and at this rate will pay for itself in a very few years.



Government of the Philippine Islands Cold Storage and Ice Plant at Manila, P.I.



Four 125 Ton "Spira-Elo" Condensers Supplied to the Manila Ice Plant by the Carbondale Machine Company



Triple Effect Evaporator Plant in the Manila Ice Plant.

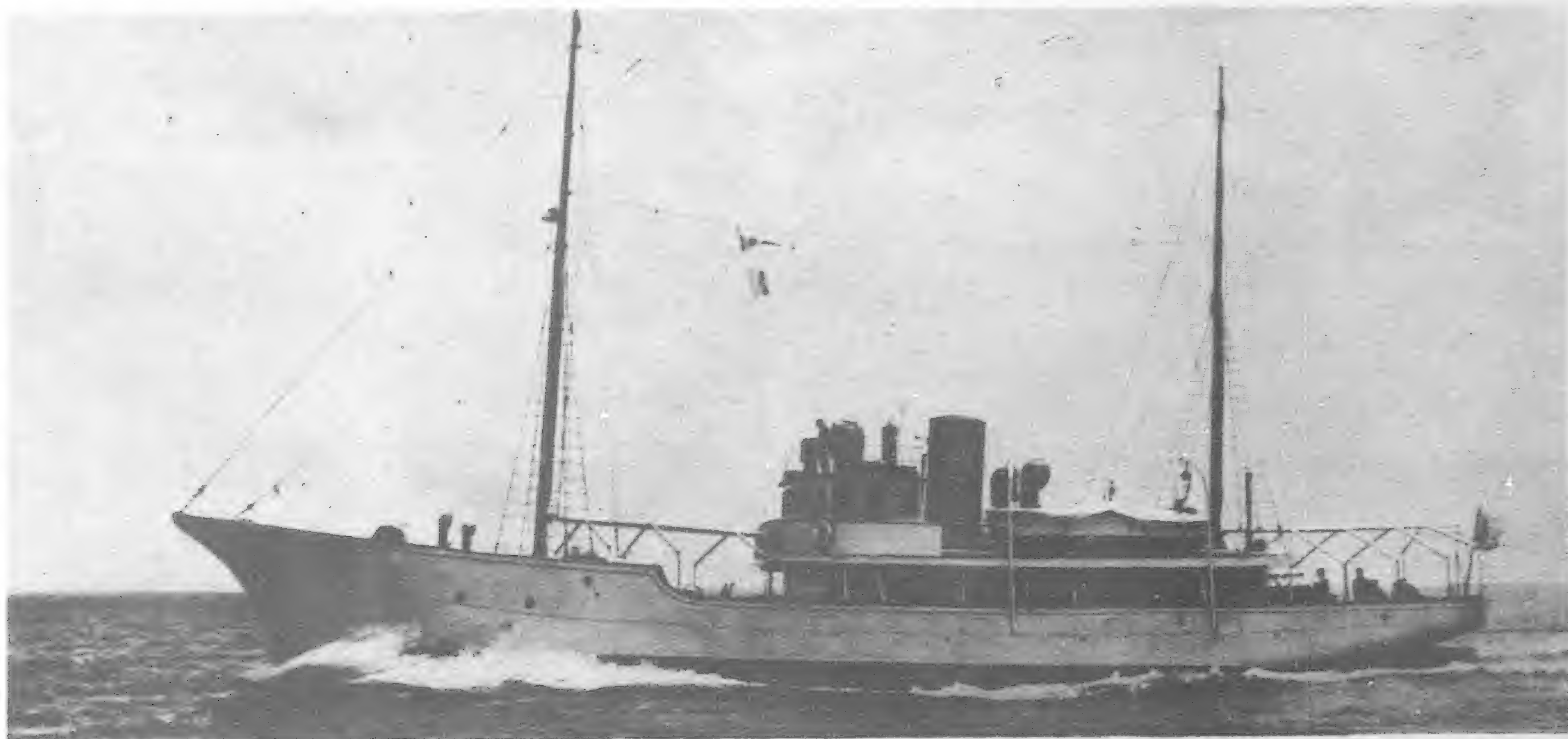


Fig. 1.—Japanese Fishing Fleet "Leader" Ship "Fusa Maru," Driven by Ikegai Oil Engines

The Ikegai Ironworks of Tokyo, Japan

THE recent World Engineering Congress held at Tokyo, focussed the attention of the visiting delegates to the immense strides Japan has made in developing her engineering industries. Many excursions and visits were made by the delegates to the leading industrial and manufacturing plants throughout the Empire and, as a consequence, several very interesting articles describing their equipment and output have appeared in the foreign engineering press.

It was an eye-opener to many of the visitors to find that Japan was not only self sustaining in many of her engineering requirements but had arrived at that stage where she was reaching out and building up a profitable export trade in China and other parts of Asia. *The Engineer* of London is publishing a series of articles on the principal machinery manufacturing enterprises of Japan, starting with the Ikegai Ironworks, whose oil engines, and machine tools are found in many of the larger machine shops of the Far East. The following is taken from *The Engineer*:—

A plant which enjoys a considerable reputation, on account of the excellence of its specialties and of the ability of the inventors and others associated with it, is that of the Ikegai Ironworks, Ltd., a concern which was established some forty years ago. The founder, Mr. Shotaro Ikegai, who then only employed a few hands, began operations by making small lathes and gas engines. To-day the company's subscribed capital is ¥6,000,000, of which 3,600,000, are paid up.

The works are in the heart of Tokyo, near Shiba Park, the shops, yards, and offices occupying an area of

3,500 tsubo.* The total floor area of the shops is 4,500 tsubo. As the works are in a district which is becoming yearly more and more congested, the company has secured land outside the metropolis in the rapidly expanding industrial center of Kawasaki—recently created a city—which lies on the bay front, midway between Tokyo and Yokohama. The land purchased there has some five times the area of the Tokyo works, and there are first-rate facilities for transportation by land and sea, which give the site very great advantages over the present works.

Ikegai Ironworks to-day employ about 600 men, while in the boom period during and following the Great War twice that number of men were on the payroll, and production was about three times the output of to-day. Standard products are machine tools and internal combustion engines, cutters of different kinds, hydraulic pumping machinery, air compressors, and printing machinery. All forged materials are obtained from the respective specialists, and so are castings, excepting those for such things as cylinders

for internal combustion engines, which are made at the works. All sorts of machine tools, large and small, and also many varieties of special machine tools built to customers' requirements, such as one-purpose machines for mass production, are among the company's products.

The accompanying engravings give views of the company's shops and the chief productions. Fig. 3 shows part of the erecting shop, while Fig. 5 shows a view of a small machine shop. Fig. 4 is a view in the cutter making shop. Among the machine

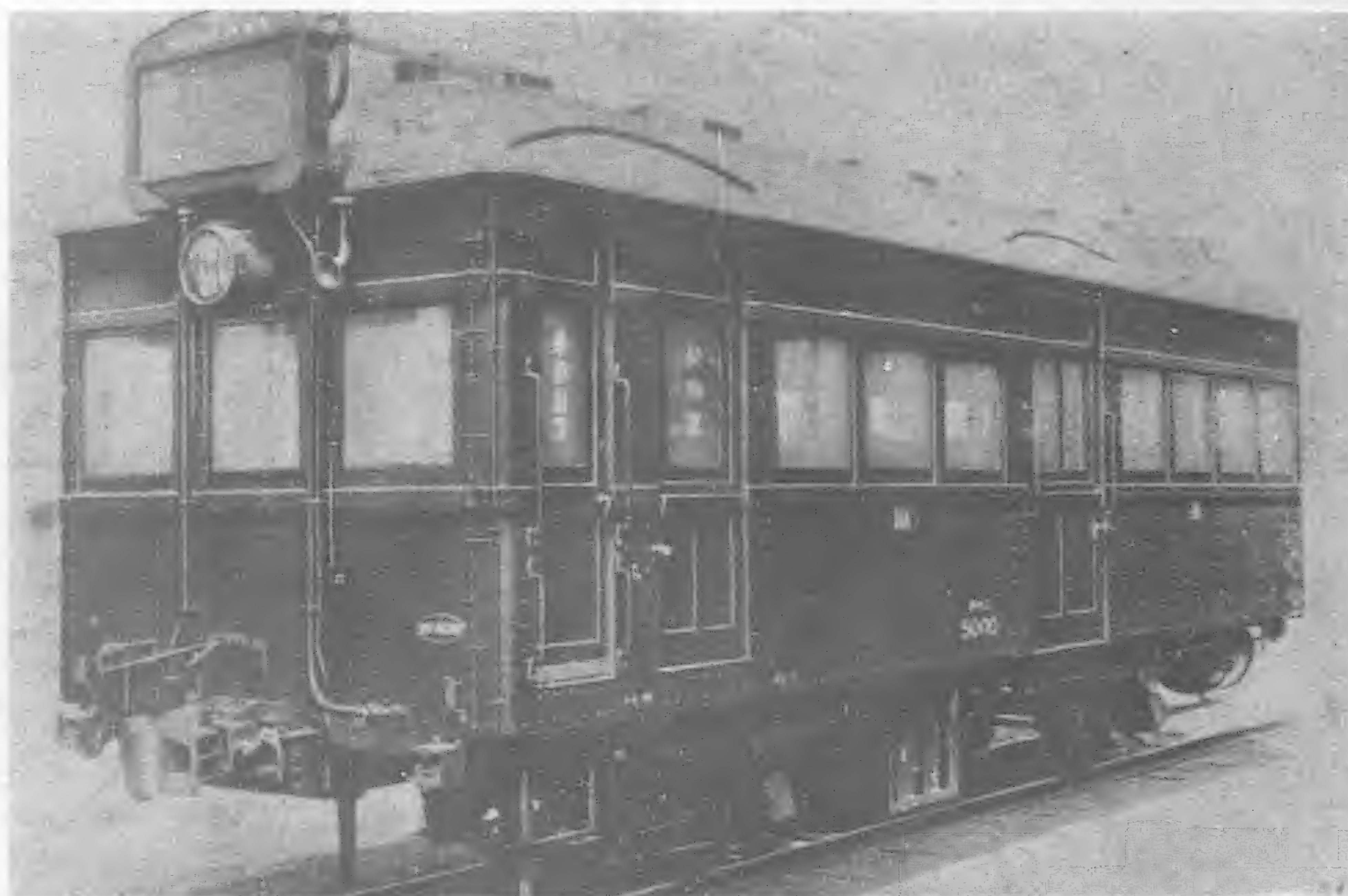


Fig. 2.—Gasoline Engine Passenger Car for Private Japanese Railway Operated by 45 H.P. Ikegai Engine

*One tsubo=thirty-six square feet (nearly).



Fig. 3.—Erecting Shop

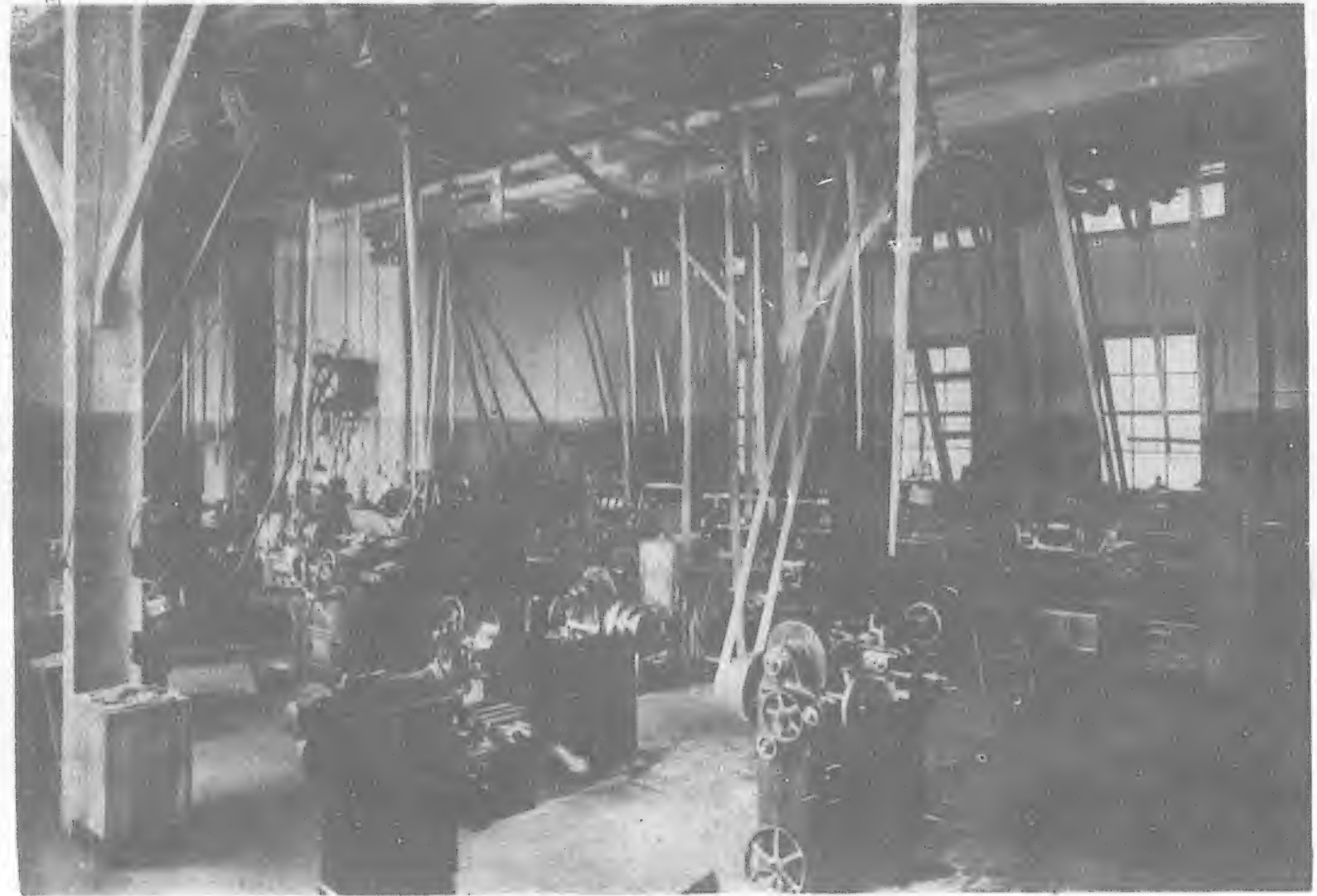


Fig. 4.—Cutter Making Shop



Fig. 5.—Small Machine Shop

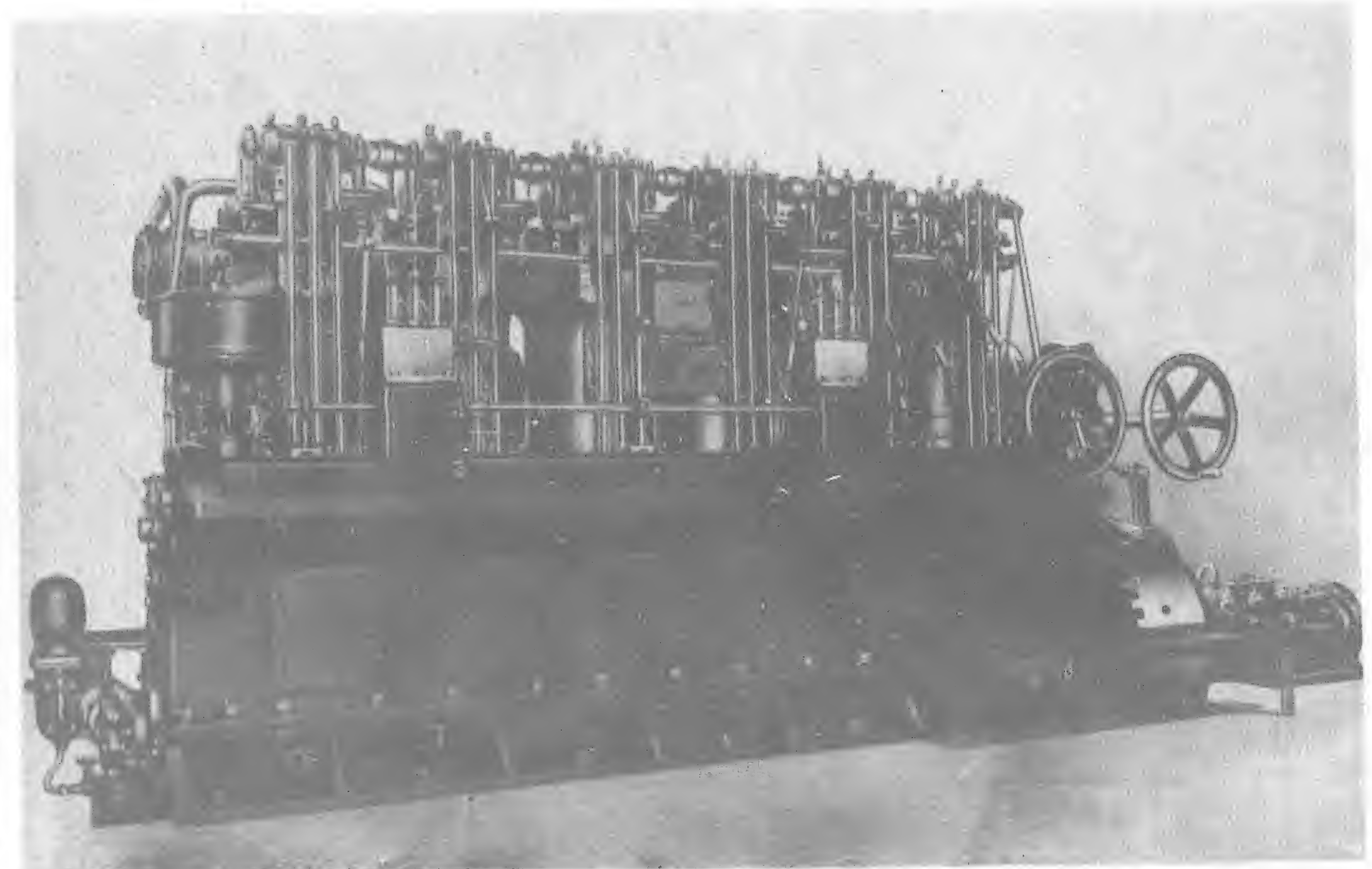


Fig. 6.—320 B.H.P. Ikegai Solid Injection Marine Oil Engine



Fig. 7.—G. M. Type 20-in. by 16-ft. 5-in. Ikegai Lathe

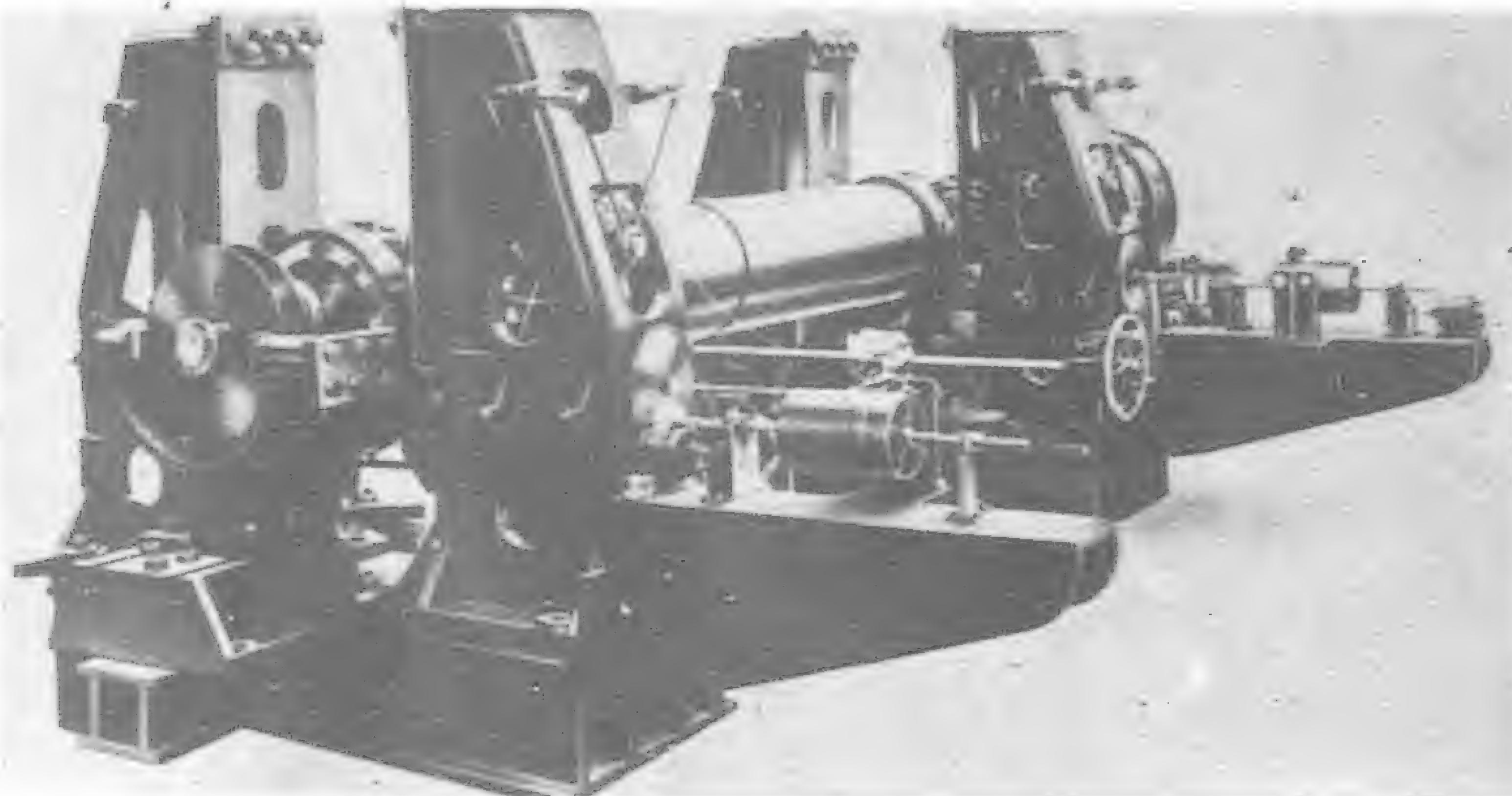


Fig. 8.—Suychiro Balancing Machine

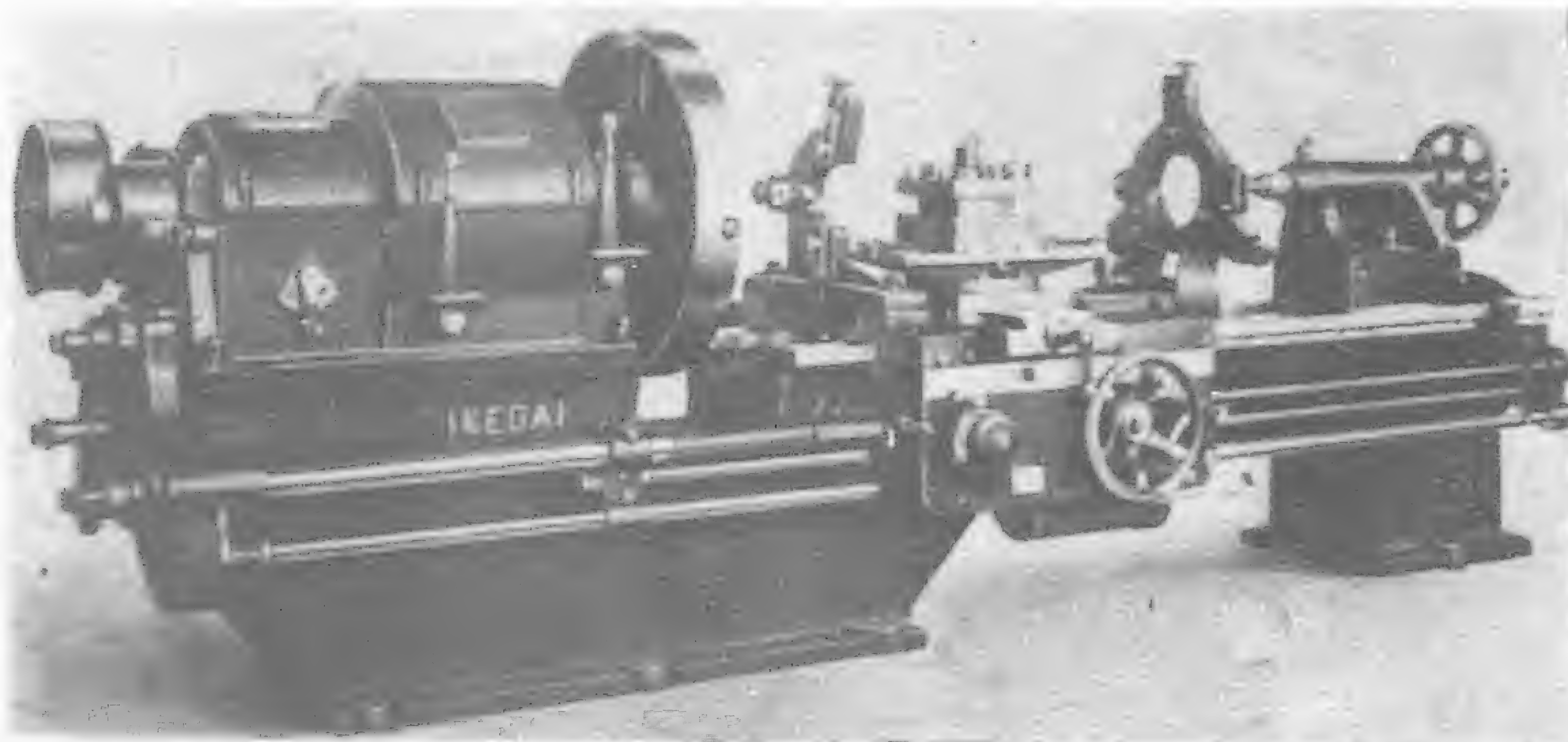


Fig. 9.—G. S. Type 12½-in. by 12-ft. Ikegai Lathe

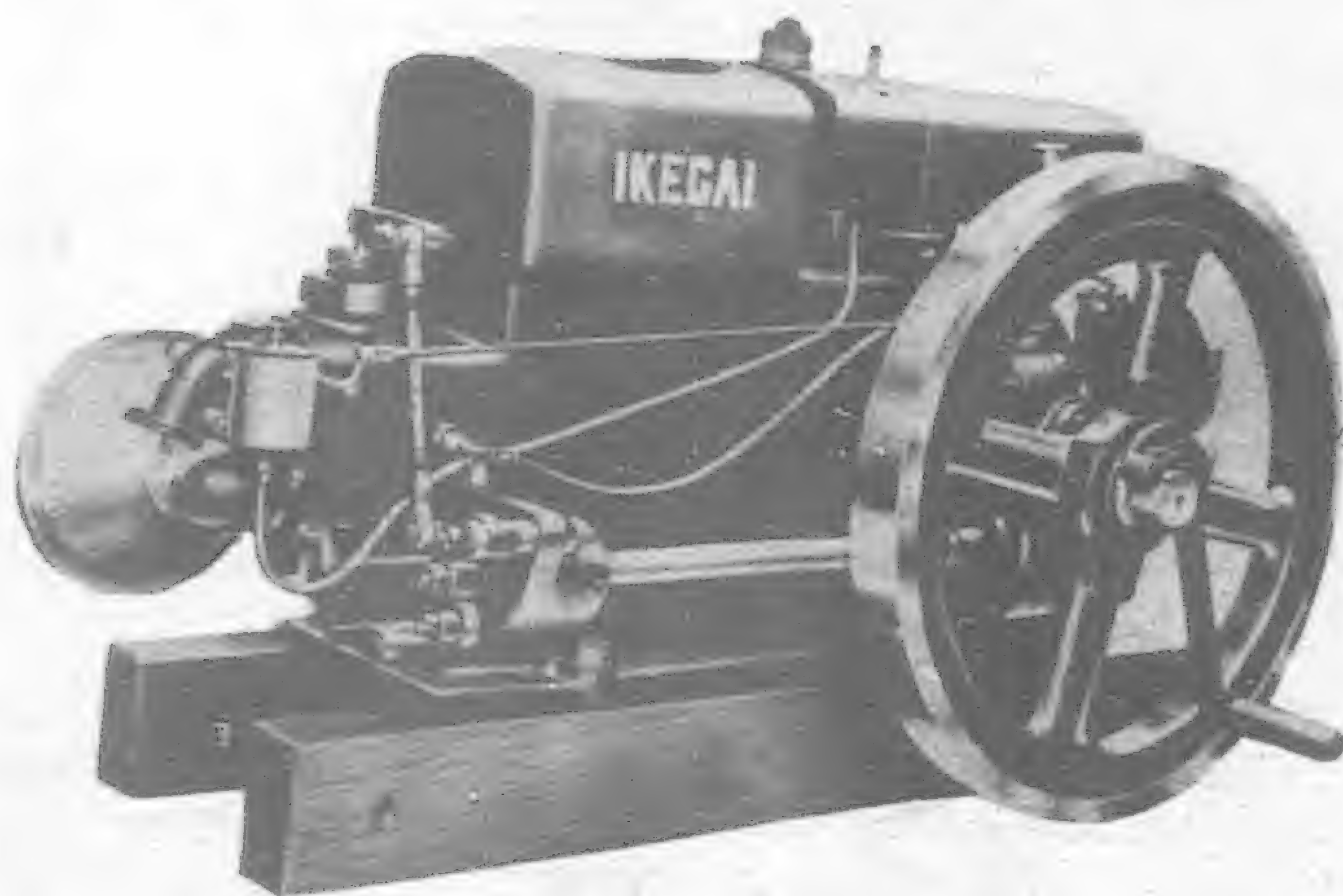


Fig. 10.—Ikegai Portable Oil Engine

tools manufactured, Fig. 13 shows a plain milling machine, size No. 5, which is of high power, and has a table 83-in. long overall and 21-in. broad. Its weight without its motor is 10,800 lb. Figs. 7 and 9 show the company's G M type, 20-in. by 16-ft. 5-in., and G S type, 12½-in. by 12-ft., lathes respectively, the former being motor driven and both having a number of characteristic features. Fig. 15 is a horizontal boring, drilling, and milling machine with the bar of 7-in. diameter, feed of spindle 5-ft., vertical and horizontal traverse 10-ft. and 12-ft. respectively. This fine tool was made to the order of the Ishikawajima shipbuilding works for boring turbine and other casings. The engraving gives a good idea of the size of this machine.

Among other specialties of which mention may be made as being manufactured by the company is a dynamical balancing machine, which was invented by Professor Suehiro, whose name is known to scientists and shipbuilders throughout the world. Fig. 8 is a general view of a medium-sized machine of this type, such as is supplied to many shipbuilders. It is made in capacities up to 10 tons and 1,000 revolutions per minute, when about 300 H.P. are required. The bearing is supplied in two sizes, 10-in. and 7-in. The machine is not only used for the balancing of turbine rotors and other high-speed rotating drums and armatures. It has been used with great success to balance heavy high-speed propellers.

Among the largest machine tools that have been manufactured hitherto, reference may be made to a lathe with 45-in. height of centers and 31-ft. between centers, and a bed 45-ft. long. The finished weight of this machine, including one 40 H.P. and one

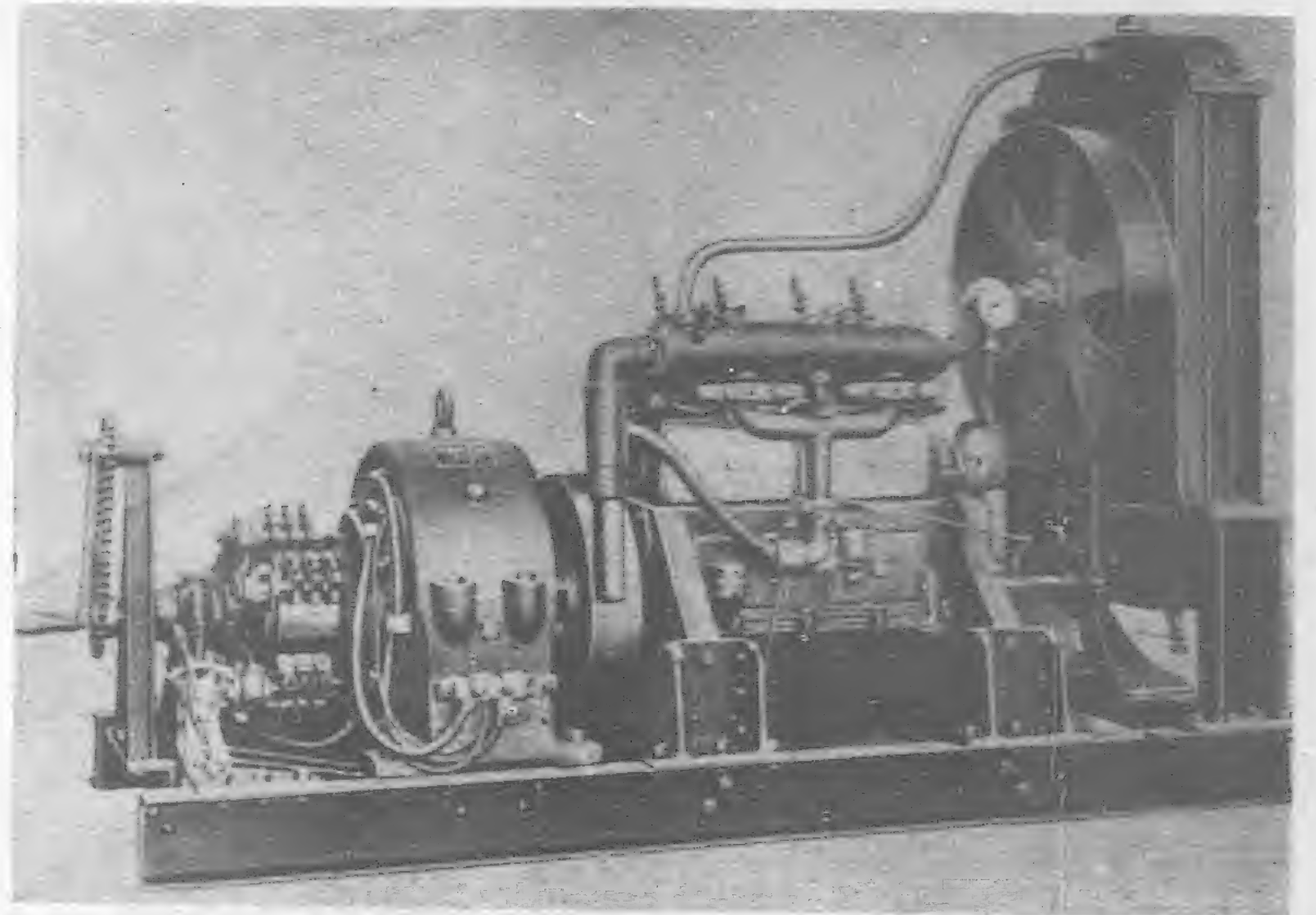


Fig. 11—15 kW. 20 H. P. Ikegai Oil Driven Generating Set

10 H.P. motors, was 70 tons. Another large tool was a turning mill with a 10ft. diameter table, which had a finished weight of 40 tons, with one 20 H.P. and one 7.5 H.P. motors.

The internal combustion engine department is kept quite separate from the machine tool department, because of the distinct nature of the skill and workmanship required in each department, and because the work of the two is not transferable. Business in this department is growing year by year, owing principally to extensive scientific researches and experimental work which the company has carried out. The foundry produces castings of high quality, for oil engine cylinders, etc. The first solid injection four-stroke engine was completed some eighteen months ago, and since then over ninety sets, with a total of more than 15,000 B.H.P., have been made or are in course of construction. Four sets of 600 B.H.P. engines are now being built for two twin-screw training ships of the Mercantile Marine School, the vessels being now on the slips of Kawasaki Dockyard. The engines, which have six cylinders, are designed to be able to withstand a 10 per cent. overload, and to be capable of developing normally 600 B.H.P. at 220 r.p.m., with six cylinders. They are to be fitted with clutches, since they will only be used for auxiliary propelling purposes, and it will frequently be necessary to disengage them from the propeller shafts when the ships are running under sail.

The largest size to which these machines can be made at present—a condition limited chiefly by transportation facilities—is 1,200 B.H.P., and it may be recorded that the Ikegai Works are,

it is claimed, a long way ahead of any other makers in Japan in the development of the solid-injection oil engine.

With regard to petrol engines, it can be stated as a fact that the company has had more experience with that type of machine and enjoys a greater production than any other firm in Japan. The largest unit ever made was of 350 B.H.P. at a speed of 1,350 r.p.m., and the smallest a $\frac{1}{2}$ B.H.P.

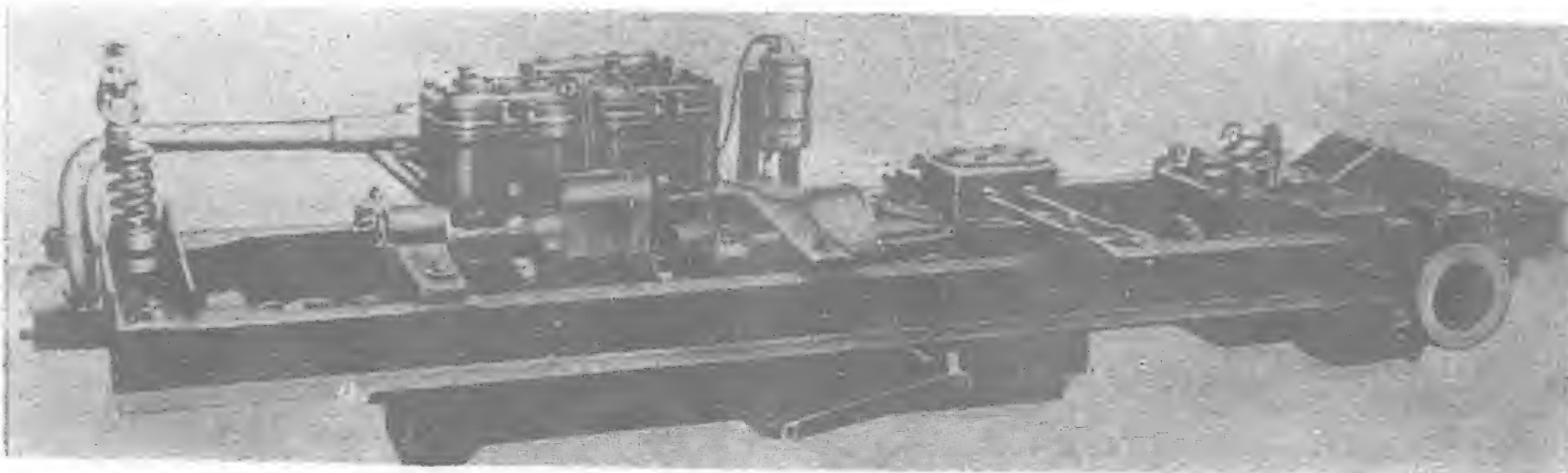


Fig. 12.—Chassis for Gasoline Rail Car

increasing demands of such a fish-eating people as the Japanese, and the Ikegai Company does a great deal of work in this connection, replacing old engines and supplying new ones.

Although hot-bulb and air-injection engines were supplied until quite recently, the development of the solid injection type by the Ikegai Company has led to the works being overwhelmed with orders for this new type, which is free



Fig. 13.—Ikegai Plain Milling Machine

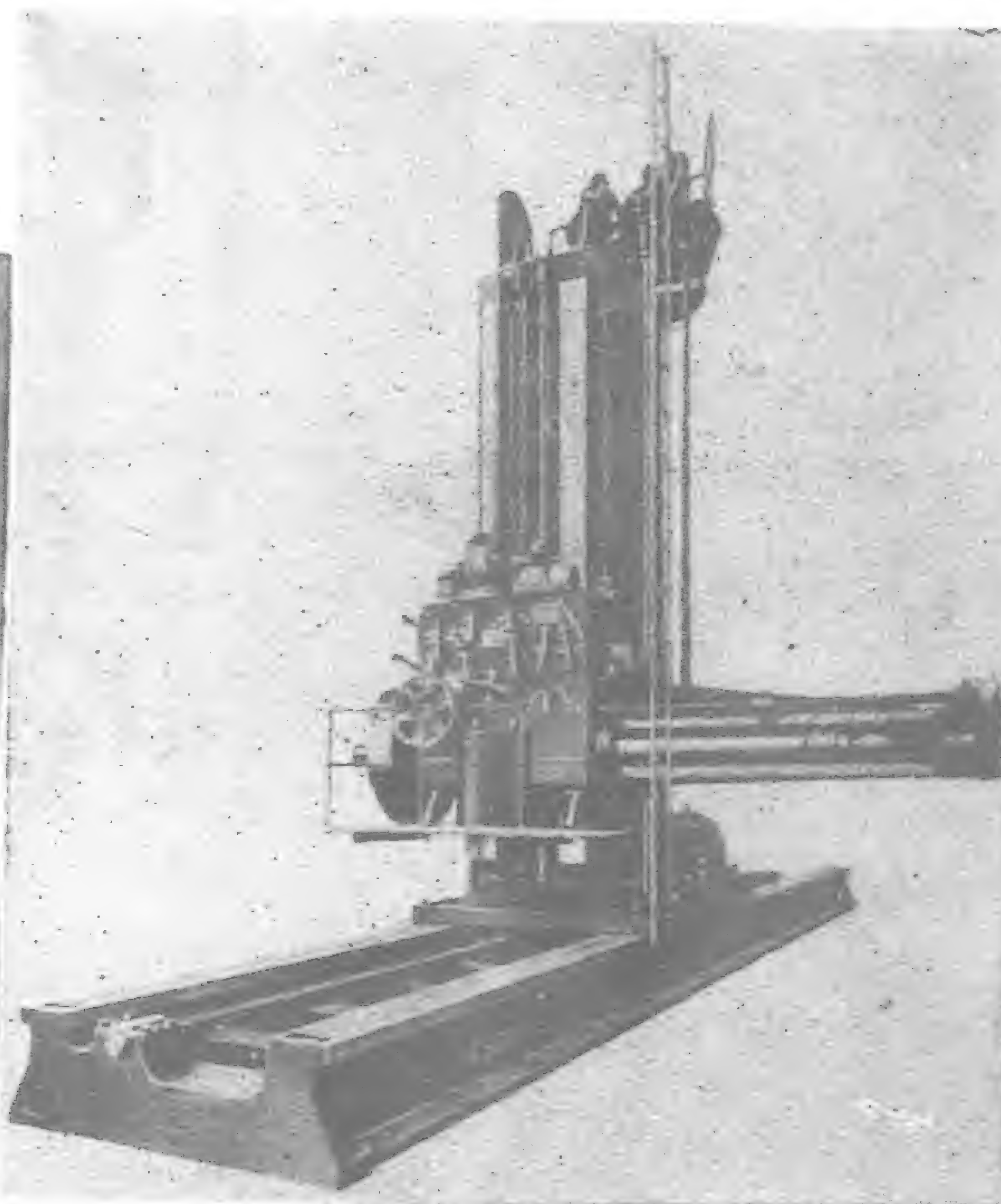


Fig. 15.—Ikegai 7-in Horizontal Boring, Drilling and Milling Machine G. M. Type Motor Drive.



Fig. 16.—Ikegai Plain Milling Machine

These engines are made of ample capacity for their rated outputs, and they are built under the closest supervision, so that they have the reputation of operating with constant reliability, which cannot be said of the cheaper work of some makers of this specialty. In the oil engine department the company turns out all sorts of types, such as machines for ship propulsion and for driving dynamos, pumps, air compressors, road rollers, railway cars, etc. Only motor car and aero engines are at present excepted. As an example of this work, attention may be drawn to Fig. 6, which shows an engine that is made in quantity for the propulsion of high-speed motor boats. It is of the air injection type, and develops 320 B.H.B.

There is also an astonishing demand for oil engines for fishing craft. Statistics show that at the end of 1926 there were registered in Japan proper 15,753 motor boats of gross tonnage of 5 tons and upwards, of an aggregate gross tonnage of 208,618 tons, excluding vessels with steam engines, trawlers and whalers. Of these vessels, about 90 per cent. can be estimated to be fishing boats, and the largest of them have engines of over 200 H.P. The number of these vessels increases every year, so as to satisfy the ever-

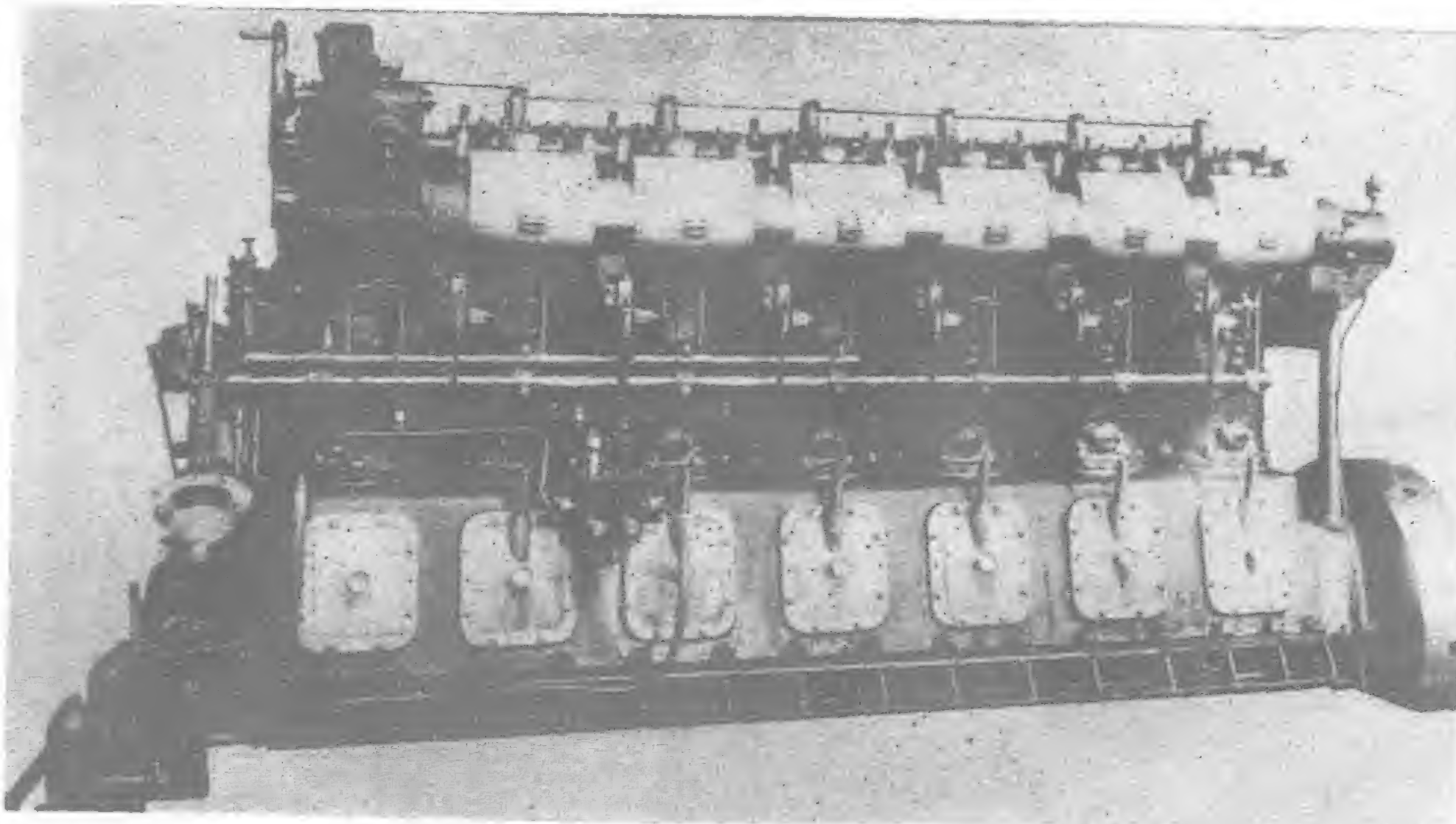


Fig. 14.—Ikegai Marine Diesel Engine

from the trouble experienced with air compressors, and gives great satisfaction to the fishing community, since it has the great advantage of being able to use any sort of heavy oil. Fish being such an important food, is handled in enormous quantities, and it is essential that the fishing fleets be efficiently equipped. In consequence, in almost every prefecture there is a "Leader" ship, which is furnished with all the equipment necessary for experiment, having all the most up-to-date gear

and appliances, and which is usually the property of the prefectural government. All such Leader ships, in fact, are under the control of the Department of Commerce and Industry. Fig. 1 shows one of them, the "Fusa-maru," which belongs to Ciba prefecture. The dimensions of this craft are:—Hull, 105-ft. long, 22-ft. 3-in. broad, and 10-ft. 3-in. deep; gross tonnage of 176 tons, and speed of 12 knots, which was far exceeded on trial. The engine of this vessel was supplied by Ikegai Works, and is shown in Fig. 6. It is of the solid-injection type and has six cylinders. It is of the reversing type, and is of 320 brake horse-power.

(Continued on page 92).

Oil Consumption for Power Use in Japan

Paper Read at the World Power Conference, Tokyo

By KEIZABURO HASHIMOTO, M.H.P., President of Nippon Oil Co., Ltd.

I—Introduction

IN writing this article the writer had great difficulty in obtaining the exact data necessary for an exhaustive study, so he ventures to say that it is not perfect in all details. All the writer could do was to collect as much data as possible, and, in cases where there was not sufficient data, to make as accurate an estimate as possible based upon all the available facts. This is also one of the reasons why all the figures are given in round numbers.

For reference, the following are the sources from which the statistics, contained in this article, have been taken. All statistics include South Saghalien, but exclude Korea and Formosa.

1. Regarding the number of automobiles, trucks and motor cycles, the statistics of the Police Bureau of the Department of Home Affairs were used.

2. Regarding the H.P. of fishing motor boats, the statistics of the Fishery Bureau of the Department of Agriculture and Forestry were consulted.

3. Regarding the H.P. of Diesel engines, the statistics compiled in 1925 by the Niigata Iron Works and the Factory Statistics of the Department of Industry and Commerce were used as a basis of estimation.

4. Regarding oil engines used in mines, the Industry and Commerce Statistics and the Factory Statistics were used.

5. Regarding heavy oil consumed in boilers since 1924, the Factory Statistics formed the basis of estimation.

6. The total mileage of flights of private aviators was obtained from data from several almanacs.

7. The yearly gasoline consumption per car has recently amounted to 1,000 gallons, but when the number of motor cars were very few it was far less than this amount. Therefore, the average was estimated to be somewhere between 500 and 1,000 gallons.

8. The gasoline consumption by motor cycles, was estimated as 10 per cent. of that used by automobiles.

9. Estimate of the average active hours of fishing boats and factories was 2,500 hours yearly and of mines 6,000 hours.

The term "oil" (Seki-yu) was formerly used in Japan to denote "lamp oil" mainly but its meaning has changed gradually since the beginning of this century, because of the new uses found for oil. To be more exact, oil, which had been used mainly for illuminating purposes, began to find its way into the world of power. Accordingly, the term "oil," formerly representing only lamp oil, has begun to have a much wider meaning, so as to include oil for power use. But in the oil market the old expression is still in use, and even now the term "oil" is employed to denote kerosene; the word "mineral

oil" being used for lubricating oil. But in this article I use the term "oil" in the broad sense to include gasoline, kerosene, gas oil, heavy oil and lubricating oil unless otherwise specified.

Among the petroleum products, there are three kinds of power fuels, viz: gasoline, gas oil and heavy oil.

Since 1916 kerosene has also been used as fuel for agricultural motor engines, but its amount has been very limited as shown below:

Year	Number of agricultural motor engines using kerosene	Kerosene Consumption Unit: 1,000 gallons
1921	1,700	about 17
1926	35,000	300

Moreover, because of the improvements in machinery and its technical operation, kerosene is destined to be replaced by gas oil; and, therefore, it may be safely asserted that oil for power use is generally limited to the three kinds mentioned above.

Of course the entire consumption of gasoline, gas oil and heavy oil is not for power fuel alone, but it is not the writer's present purpose to go into these details.

II—Gasoline

Motor vehicles and gasoline consumption are correlative to each other. One can say that gasoline invented motor vehicles, or that the invention of motor vehicles created the demand for gasoline. Both are more or less true. Motor vehicles constitute the principal consumers of gasoline, followed by aeroplanes and locomotives.

Automobiles were first imported into Japan in or about 1907, and since then their numbers and gasoline consumption have greatly increased, as is shown below:

Year	Number of automobiles and trucks	Gasoline Consumption Unit: 1,000 gallons
1907	500	200
1912	1,000	500
1916	3,000	1,600
1921	15,000	10,000
1922	18,000	12,000
1923	21,000	15,800
1924	25,000	20,000
1925	33,000	28,000
1926	37,000	33,300
1927	47,000	45,000
1928	60,000	60,000

The number of motor cycles and their gasoline consumption have also increased, since the beginning of the reign of the Emperor Taisho, as shown below:

Year	Number of motor cycles	Gasoline Consumption Unit: 1,000 gallons
1916	800	40
1921	2,000	100
1926	11,000	600
1927	13,000	700
1928	16,000	800



Oil Fields of Japan

JAPAN'S OIL PRODUCTION

	Barrels	Tons
1926*	1,802,748	257,535
1927†	1,650,000	233,714
1928‡	1,690,000	241,428

*If North Saghalien be included, 1926 production may be set at 2,001,548 barrels, or 287,364 tons.

†If both North Saghalien and Formosa be included, 1927 production was 2,280,900 barrels, or 325,843 tons.

‡If both North Saghalien and Formosa be included for 1928 the production would amount to 2,724,907 barrels or 389,415 tons.

Aeroplanes began to appear in the sky of Japan about 1912, but aeronautic development in our country has not been remarkable, and even now the majority of aeroplanes are in the military service. Since the gasoline consumption by the Army and Navy air corps is one of the military secrets, one does not venture to estimate it, but the activities of civilian aviators have been of minor importance as shown below :

Year	Total distance flown (Unit : 1,000 kilometers)	Gasoline Consumption (Unit : 1 gallon)
1921	65	6,500
1922	150	15,000
1923	280	28,000
1924	410	40,000
1925	580	55,000
1926	765	75,000

For many years gasoline has also been used as locomotive fuel, but its quantity has been very limited. Recently, however, because of the lower price of oil, some railway companies in the country have adopted locomotives which consume gasoline. On such railroads, where traffic is not heavy, and where there is such a waste of coal and labor in starting up the engines after a long interval, oil is preferred. Of course electric locomotives can save quite easily in this, but electrification requires much money. Up to the present time the consumption of gasoline by locomotives, however, cannot be said to be large enough to materially increase the gasoline consumption, and so it has been treated as negligible in this article.

To summarize the above, the total gasoline consumption is as follows :

Year	Gasoline Consumption (Unit : 1,000 gallons)
1907	200
1912	500
1916	1,640
1921	10,107
1922	12,015
1923	15,828
1924	20,040
1925	28,055
1926	33,975
1927	45,700
1928	60,800

On the other hand, the supply to meet this demand is as follows :

Year	Supply	Actual Supply (Unit : 1,000 gallons)
1907	1,800	1,700
1912	2,000	1,900
1916	4,500	4,200
1921	14,000	13,300
1922	17,000	16,000
1923	22,000	20,900
1924	30,000	28,500
1925	37,000	35,000
1926	48,000	45,500
1927	59,000	56,000
1928	73,000	69,000

(In the above statistics, to get the "Actual supply," 5 per cent. has been deducted, as a transportation loss, from the total amount available from domestic production and from imports. The term "supply" is adopted for the domestic production plus imports and minus exports).

As the consumption by the Army and Navy air corps is excluded from the above table, figures do not really represent the total gasoline consumption, but, roughly speaking, the difference between supply and consumption in the above statistics may be considered as the amount of oil consumed in uses other than power, assuming that annual stocks remain almost constant.

Tabulating the above :

Year	Gasoline Consumption for power use (Unit : 1,000 gallons)	Actual supply (Unit : 1,000 gallons)	Gasoline Consumption for other uses than power (Unit : 1,000 gallons)
1907	200	1,700	1,500
1912	500	1,900	1,400
1916	1,640	4,200	2,560
1921	10,107	13,300	3,193
1922	12,015	16,000	3,985
1923	15,828	20,900	5,072
1924	20,040	28,500	8,460
1925	28,055	35,000	6,945
1926	33,975	45,500	11,525
1927	45,700	56,000	10,300
1928	60,800	69,000	8,200

III—Gas Oils

Fishing motor boats, using gas oil as fuel, have increased within twenty years, in spite of the recent tendency, on the part of some, to change to the Diesel engines which consumes heavy oil.

Year	Fishing boats (Unit : 1,000 H.P.)		Gas Oil Consumption (Unit : 1,000 barrels)	
	Total Including Diesel Engines	Diesel Engines	Total Including Diesel Oil	Diesel Oil
1916	50	—	250	—
1921	120	1	625	5
1922	135	2	738	9
1923	160	5	909	23
1924	190	10	1,022	42
1925	215	20	1,136	85
1926	245	30	1,303	125
1927	280	50	1,534	210
1928	320	80	1,704	341

The H.P. and oil consumption by engines in mines reached its highest figure in 1922, and, since then, there has been a gradual decrease :

Year	H.P.	Oil Consumption (Unit : 1,000 barrels)	Year	H.P.	Oil Consumption (Unit : 1,000 barrels)
1912	4,000	45	1924	6,500	89
1916	6,000	82	1925	5,500	75
1921	6,200	85	1926	5,400	74
1922	7,600	105	1927	5,300	74
1923	6,200	85	1928	5,000	68

This does not denote that there is any decline in the mining industry, but rather the spread of electrification.

The number of H.P. of engines in factories and their oil consumption made a tremendous increase during the prosperous times of Japanese business and industry in 1918 and 1919, but such a tendency reached its maximum in 1921, and then fell to 11,000 H.P. and 62,000 barrels in the next year. Then the H.P. again increased, owing to the increase of Diesel engines, while gas oil consumption has remained almost unchanged.

Year	Oil Engines in Factories H.P.		Gas Oil Consumption (Unit : 1,000 barrels)	
	Total Including Diesel Engines	Diesel Engines	Total Including Diesel Oil	Diesel Oil
1907	7,000	—	41	—
1912	7,200	—	42	—
1916	8,000	—	45	—
1921	20,000	—	114	—
1922	11,000	—	62	—
1923	12,500	500	72	—
1924	13,000	1,000	74	—
1925	16,000	4,000	74	—
1926	22,000	9,000	74	—
1927	Figures unavailable		—	—
1928	Figures unavailable		—	—

In summing up the above figures, a brief explanation will be necessary.

1. Oil consumed in Diesel engines is heavy oil, and therefore is excluded from the following table.

2. The combined amounts of the above stated figures do not exactly agree with the figures mentioned below. For example, while the gas oil consumption in 1907 is stated to be 41,000 barrels in the foregoing statistics, the table, mentioned below, gives it as 91,000 barrels ; this difference represents the consumption by fishing motor boats and oil engines in mines. The only reason for not including them is the difficulty in obtaining exact data upon which such a classification should be based. Another reason why the two tables do not coincide is because of the adoption of round numbers. This is also the case with the gasoline and heavy oil columns in this article.

Year	Gas Oil Consumption (Unit : 1,000 barrels)
1907	91
1912	170
1916	386
1921	829
1922	909
1923	1,045
1924	1,147
1925	1,204
1926	1,386
1927	1,477
1928	1,534

To meet this requirement, the supply has been as follows :

Year	Actual supply of Gas Oil (Unit : 1,000 barrels)	High grade heavy oil imported as substitute of Gas Oil (Unit : 1,000 barrels)	Gas Oil (Unit : 1,000 barrels)	
			For Power use	For other uses than Power
1907	227	—	91	136
1912	216	68	170	114
1916	432	57	386	102
1921	784	114	829	69
1922	829	136	909	56
1923	795	170	1,045	minus 80
1924	966	227	1,147	46
1925	1,045	250	1,204	91
1926	1,159	341	1,386	114
1927	1,051	568	1,477	142
1928	1,079	682	1,534	227

The above table shows that there has been a steady increase in the supply of gas oil, except in 1923, when there was a falling off of about 80,000 barrels. This was the result of the temporary decrease in consumption after the great earthquake on September 1, of that year, and the exclusion of a great amount of imports during September and October, when no statistics were made regarding importation. Of course, if this had been taken into consideration, and a proper estimation of the imports had been made the decrease would not have appeared in the column of supply, even though a small quantity of gas oil stock had been destroyed by the fire following the earthquake.

IV—Heavy Oil

The principal consumers of heavy oil are boilers and Diesel engines. Of these, vessels in military and private service are the heaviest users, their fuel consumption being larger than the domestic supply. The men-of-war, therefore, are obliged to use the imported heavy oil, and ocean-going vessels are generally bunkered at ports of foreign countries which are rich in oil production. As has been said, the consumption by the Navy is one of the military secrets, while consumption by ocean-going vessels of private ownership is supposed to be about 400,000 tons annually. These figures, however, are not included in the following statistics.

Heavy oil consumed in the boilers can easily replace coal when its price is low, and an ample supply is assured ; but, unhappily, Japanese oil production, and, consequently, the supply of heavy oil, are very small, and the demand is always governed by the amount of the supply.

Though the adoption of Diesel engines is the latest tendency, the growth of heavy oil consumption has been quite remarkable, and this increase is more stimulated by the new regulation exempting mineral oil from import duty in 1920.

Diesel engines on land are as follows :

Year	H.P. (Unit : 1,000 H.P.)	Oil Consump- tion (Unit : 1,000 barrels)	Year	H.P. (Unit : 1,000 H.P.)	Oil Consump- tion (Unit : 1,000 barrels)
1921	5	34	1925	30	170
1922	8	45	1926	45	261
1923	10	57	1927	70	398
1924	20	114	1928	100	568

Summarizing the above :

Year	Heavy Oil Con- sumption by Diesel Engines on Land and Sea (Unit : 1,000 barrels)	Supply (Unit : 1,000 barrels)	Heavy Oil Con- sumption by Boilers and for other uses (Unit : 1,000 barrels)
1907	—	341	341
1912	—	284	284
1916	—	659	659
1921	39	159	120
1922	55	193	138
1923	80	477	397
1924	156	625	469
1925	256	852	585
1926	386	852	466
1927	608	1,306	698
1928	909	1,533	624

As the above table shows, a large amount of heavy oil was consumed in 1916 by boilers and for other uses. This was because of the fact that in that year the Japanese oil output, especially heavy oil production, increased abruptly ; and, consequently prices were lowered considerably. In many cases heavy oil thus took the place of coal as boiler fuel. However, oil production again decreased in and after the next year, and the demand had to be limited again.

Since 1923, however, heavy oil has begun to be imported in large quantities owing to its decline in price in America, and to the benefits from the regulation exempting mineral oil from import duty for Japanese consumers.

Of course heavy oil is also consumed for heating purposes and many other uses, but it is to be regretted that data for this classification are unavailable, as yet.

In recapitulation, the following is the oil consumption in Japan :

Year	Gasoline (Unit : 1,000 barrels)	Kerosene (Unit : 1,000 barrels)	Gas Oil (Unit : 1,000 barrels)	Heavy Oil (Unit : 1,000 barrels)
1907	5	—	91	341
1912	12	—	170	284
1916	40	—	375	659
1921	245	—	829	159
1922	286	—	909	193
1923	377	1	1,045	477
1924	477	2	1,147	625
1925	668	5	1,204	852
1926	809	7	1,386	852
1927	1,088	9	1,477	1,306
1928	1,448	11	1,534	1,534

V—Conclusion and Résumé

Oil consumption for power use has continued to increase yearly, as is shown above, and there is little doubt but that this tendency will continue for some time to come. But oil is not used for power alone ; and where oil for power is used, oil for lubrication is also demanded.

Moreover, oil has many other uses, viz : as an absorbent, as a solvent, as a cleaner and purifier, as heating fuel, as a source of light, as raw material of asphalt, for medical purposes, etc., etc.

In 1928, Japan proper consumed about 7,143,000 barrels of oil, not to speak of the consumption by the Navy and ocean-going vessels. In addition, also, Korea and Formosa consumed about 1,190,000 barrels of oil.

On the other hand, the Japanese crude oil production in the same year was only about 1,800,000 barrels, or only one-fourth of the demand. It is the opinion of the writer that this does not mean the poverty of our underground resources, for as yet there has never been a full exploitation of Japanese oil fields. Under these circumstances, Japan is obliged to face two most delicate problems which are apt to be contradictory to each other, i.e. on one hand, Japan must insure a continued supply of oil, and on the other hand, must limit importation, so as to give an impetus to the development of her own oil mining industry.

Heretofore, there has been no obstacle in the way of oil importation, but Japan must guard it in the future. Of course conservation is good and necessary, but the interruption of exportation, in the name of conservation, should not be allowed in any case. Exportation is of no benefit to the supplying country, and in order to be able to get a profit by selling the surplus, there must be countries which do not produce as much as they use. The exporting country receives profits from the importing country, so the former must fulfil her duty by continuing the supply. Only when the importing country has a supply sufficient to meet her demand, is the supplying country justified in limiting exportation. Furthermore, in such a case the supplying country should in no way hinder the exploitation of the mineral resources in the importing country. If the exporting country should take such steps, the importing country may be obliged to take necessary steps of self-defence, such as an increase of the custom tariff, but in this way international co-existence would be destroyed.

In other words, anything which will hinder the development and exploitation of underground resources, or anything like monopoly of such resources cannot be justified. Countries rich in natural resources should, for the welfare of mankind, allow other countries to operate in her land. Some fear the exhaustion of the oil resources. There are, however, many means of conservation, for example oil consumption may be greatly decreased by the improvement in the make and operation of the consuming machines.

The natural resources of the world belong to mankind, and if one country utilizes them to the exclusion of others, international co-existence cannot be realized. The principle of co-existence is not the cry of the weak. The one who wants to live with real satisfaction must think how to keep others alive and happy as well. To insure perpetual life by oppressing others will not be possible, regardless of who or what countries are doing it. Therefore, the writer hopes, by writing this article, that he can to a small degree, advocate the principle of international co-existence.

Perak River Hydro-Electric Scheme

THE Perak River Hydro-Electric scheme provides at present for two main generating stations, a steam driven station at Malim Nawar and a hydro station at Chenderoh on the Perak River. A 66,000 V. double overhead transmission line is to join these two stations and out door substations will transform down at three points to 6,600 Volts for local distribution, and to 22,000 Volts for secondary overhead transmission system.

The whole scheme is of considerable magnitude, the construction of the dam for the Chenderoh Station being in itself a piece of civil engineering of no mean order. Messrs. Rendel, Palmer and Tritton are the Consulting Engineers for the whole scheme. Messrs. Metropolitan Vickers Electrical Co., Ltd., were entrusted with the contracts for the whole of the switchgear, which includes the complete equipment of all the outdoor stations as well as the low tension control gear, etc.

All the apparatus used in these Stations is of this Company's standard design. The 66,000 V. oil circuit breakers are of the outdoor type, having a breaking capacity of 560,000 kVA at normal voltage. They are all automatic and electrically operated. The bushings are of the spiral wound condenser type of 400 amperes and 88 kV normal rating. They are guaranteed for a dry flash-over of 200 kV and a wet flash-over of 160 kV. Ring type current transformers are fitted in a manner to allow of easy inspection and removal.

An electric periscope is supplied for examination of the oil circuit break contacts without the trouble of opening up the breaker or removal of the oil from the tank.

A difficulty was experienced with the lubrication of the mechanism parts, since the tropical heat dried up any ordinary thick grease and caused clogging; while a medium grease became so thin that it just ran off, and an oil evaporated. Tests were carried out in the M-V research laboratories on a number of lubricants, both grease and oil, and the best was eventually chosen for the purpose.

The exigencies of the climate also necessitated special treatment of all coils and instrument transformer windings. In the early stages it was found that the excessive damp and heat acted on the fibrous content of the coil coverings and gave rise to a fungus growth. These coverings were later suitably sealed against this trouble.

The 22,000 V. oil circuit breakers are also of the out-door type and have a breaking capacity of 175,000 kVA, the condenser bushings being rated at 37 kV. Bushing type current transformers are also fitted to these circuit breakers.

The isolating switches used on the 6,600 V. lines are rated at 400 amperes and comprise two robust post insulators of two units each. The rotating post is mounted in a heavy steel babbit lined bearing, with ball bearings for the thrust.

The blade is a steel tube clamped to the rotating post in a corona shield. The other end carries the brass fitting which engaged with the fixed contact. This latter is made up of two standard 200 amp. finger units, that are mounted in a weatherproof steel casing which also acts as a corona shield.

These switches are arranged for either upright or inverted mounting, and also for remote mechanical control as three pole gang operated sets. Earth contacts are fitted to all line switches and the operating mechanism is arranged for locking in any of the three positions: Open, closed, or earth.

The 22,000 V. isolators are high pressure contact switches of approved design. Two laminated copper brush units form the

fixed contact, while the blade is articulated with an adjustable contact. The rotating portion moves in a liberal bearing, the whole being mounted on a stout channel iron base all heavily galvanized. The pin type insulator units are of the well known Faradoid or potential and flux surface type.

The current transformers used are of two kinds—the bushing type and the outdoor service wound type. The former are carefully designed to give the largest volt-ampere capacity possible, but, from their very nature, it will be appreciated that, with transformers of this kind, it is not possible to guarantee phase angle accuracy, ratio, or volt ampere rating, since these will all vary with the impedance of the whole of the secondary circuit. In cases where these characteristics are of importance, such as for the operation of wattmeters, etc., bushing transformers have not been used, but wound type in their stead. For all other cases, such as for ammeters and protective relays, perfectly accurate results are obtained by the proper calibration of instruments and transformers.

The wound type transformers are oil immersed and fitted with 37 kV condenser bushings. They are mounted on an extension of the 22 kV oil circuit breaker supporting framework.

There are no potential transformers coupled directly to the 66 kV lines. There are, however, transformers of a ratio 22,000/110 volts for the operation of relays and instruments. These are of the outdoor type, oil immersed, and of ample capacity for the work in hand. They are protected by an outdoor pattern switch, resistance, fuse combination of proved design in tropical climates.

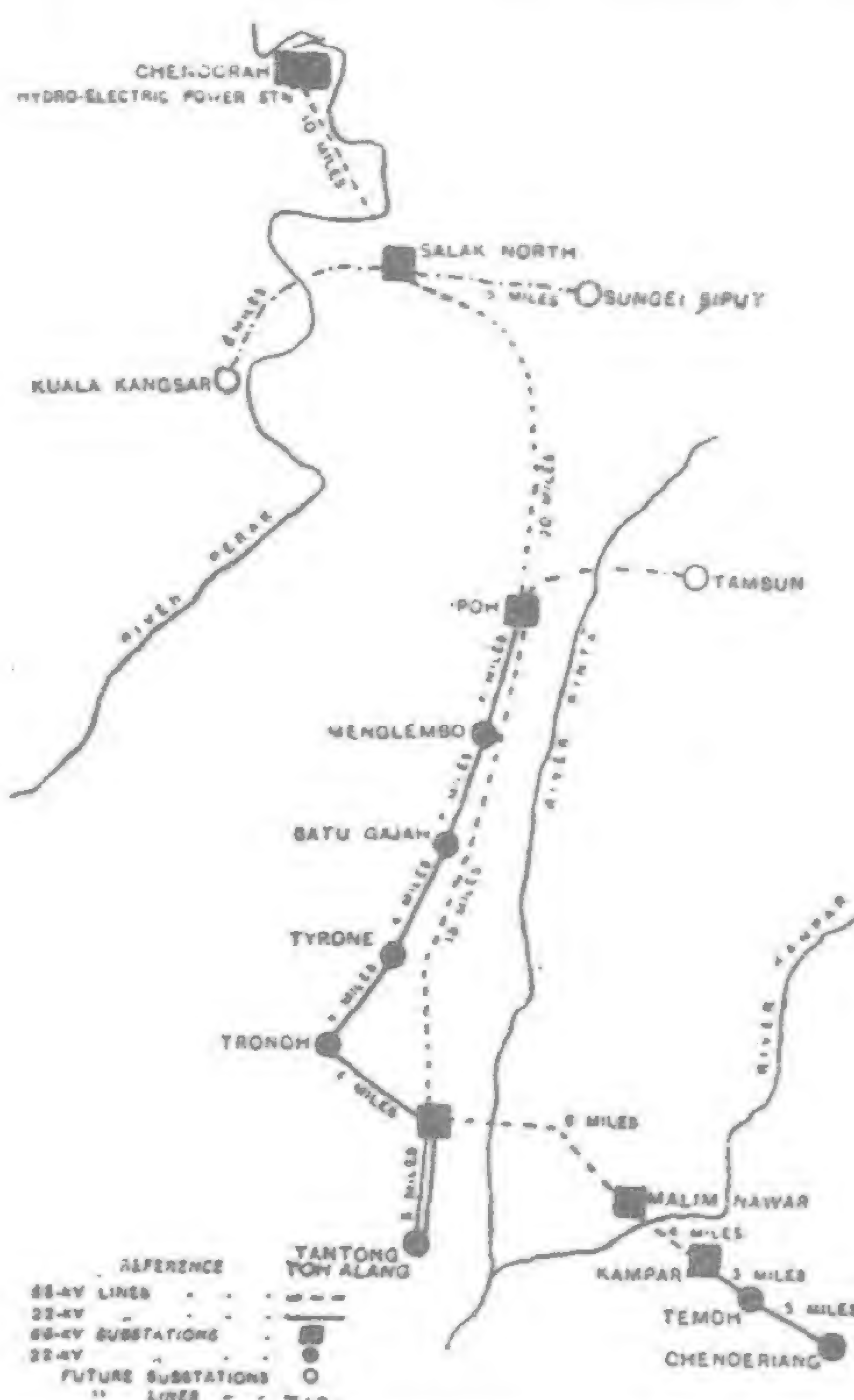
The steam station at Malim Nawar comprises three turbo alternator sets, each of 7,500 kVA capacity at 6,600 volts. This station was the first built on the scheme and was officially put into commission on the 12th of December 1928.

Until the hydro station at Chenderoh is energized, Malim Nawar will be the supply point for the whole area. And it is intended that this supply shall be maintained at 22 kV throughout the system until the other power station comes into action, when the 66 kV supply will then operate.

At Malim Nawar, the main supply cables, which consist of six single core .3 sq. in. paper insulated lead covered cables, run from the machines to a metal-clad board of type K.2 units, situated in the control room above. From the busbars of this board two of the metal-clad units control the supply to two 3 phase banks of outdoor 6.6/22 kV step-up transformers, each of 7,500 kVA capacity. The supply is then commoned on to a 22 kV outdoor bus structure, and from there it is taken to a three phase bank of 22/66 kV step-up transformer of 7,500 kVA capacity, which, in turn, feeds the 66 kV busbars.

The latter is a double bus structure and links up with the double 66 kV line from Chenderoh. When the supply is from Chenderoh along these lines, the machines at Malim Nawar may be run as synchronous condensers, as required. From the 22 kV busbars there are two outgoing southbound lines for the supply to Kampar, Temoh and Chenderiang.

The control desk for the H. T. outdoor gear is of the bench-board pattern, the bench portion of which mounts the oil circuit breaker control switches, indicating lamps and mimic diagram. Ammeters are mounted on the flat part of the board above, and an eight day clock surmounts the whole. On the rear panels, which are of the flat type, relays, wattmeters, testing links and terminals, etc., are mounted. A swing bracket to



Transmission System of Perak Hydro-Electric Scheme



Talang Pamaya Station, Showing Switch-house, Rail Track, Gantry, etc.



View of the Tanjong Tualang Station

the side carries voltmeters, synchroscope, frequency and power factor meters.

All the panels are black enamelled slate and mounted on a stout steel framework with a door at each end. This forms a compact control unit, the interior of which carries all the small wiring neatly arranged in correct colors, resistance units, terminal board and bus wires, etc.

The desk board is mounted in the control room, as also is the metal-clad board. In the same room there is a 12 panel station service board, which receives the supply from the three 600 kVA transformer units, and controls various feeders, such as boiler house, pumps and the supply to a general service board, etc., The latter board, also in the control room, is divided into sections, one of which controls the incoming supply from the station service board, the supply to the various distribution boards, and a 42 kW motor generator set, while another controls a 110 volt d.c. supply from the battery room to governor motors, circuit breaker controls, emergency lighting, etc., An automatic circuit breaker is arranged to operate in the event of the failure of the normal 230 volt a.c. lighting supply and close the d. c. emergency circuit. Another section of this general service board controls the battery charging by the 42 kW motor generator set, and the supply to the main alternator fields and exciters.

In the control room there are also mounted the voltage regulator panels, automatic field switch pillars, exciter pedestals and temperature indicator board.

Starting up oil circuit breakers for the alternators when required to run as synchronous condensers, are mounted in steel cubicles situate below the control room. On the same floor are the earthing switch cubicles and earthing resistance.

The star points of the three outdoor step-up transformers are "commoned" and taken to earth through two parallel paths consisting of a Petersen coil in one leg and an ohmic earthing resistance in the other. Each of these pieces of apparatus is coupled to the common star connection through a single pole oil circuit breaker.

Automatic synchronising is provided between the main machine and busbars.

The sub-stations at Talang Pamaya and Selibin are situated at the opposite ends of a ring main, from which a number of secondary sub-stations distribute power to the numerous mines in this area. The 66 kV line between Chenderoh and Malim Nawar is stepped down at Selibin to 22 kV. And this 22 kV line runs parallel with the 66 kV line to Talang Pamaya, where the pressure is similarly stepped down to 22 kV.

At Selibin there is a single 66 kV bus structure fed by duplicate feeders tapped off the main lines from Chenderoh. These H. T. bars feed two transformer equipments—one of 5,000 kVA capacity, stepping down to 22 kV and the other of 3,000 kVA stepping down to 6.6 kV.

The 22 kV bars, which are also a single bus structure, supply one end of the ring main to Talang Pamaya, as well as two parallel feeders to Ipoh town. These two feeders to Ipoh town each supply a 2,250 kVA transformers bank which step the pressure down to 11 kV.

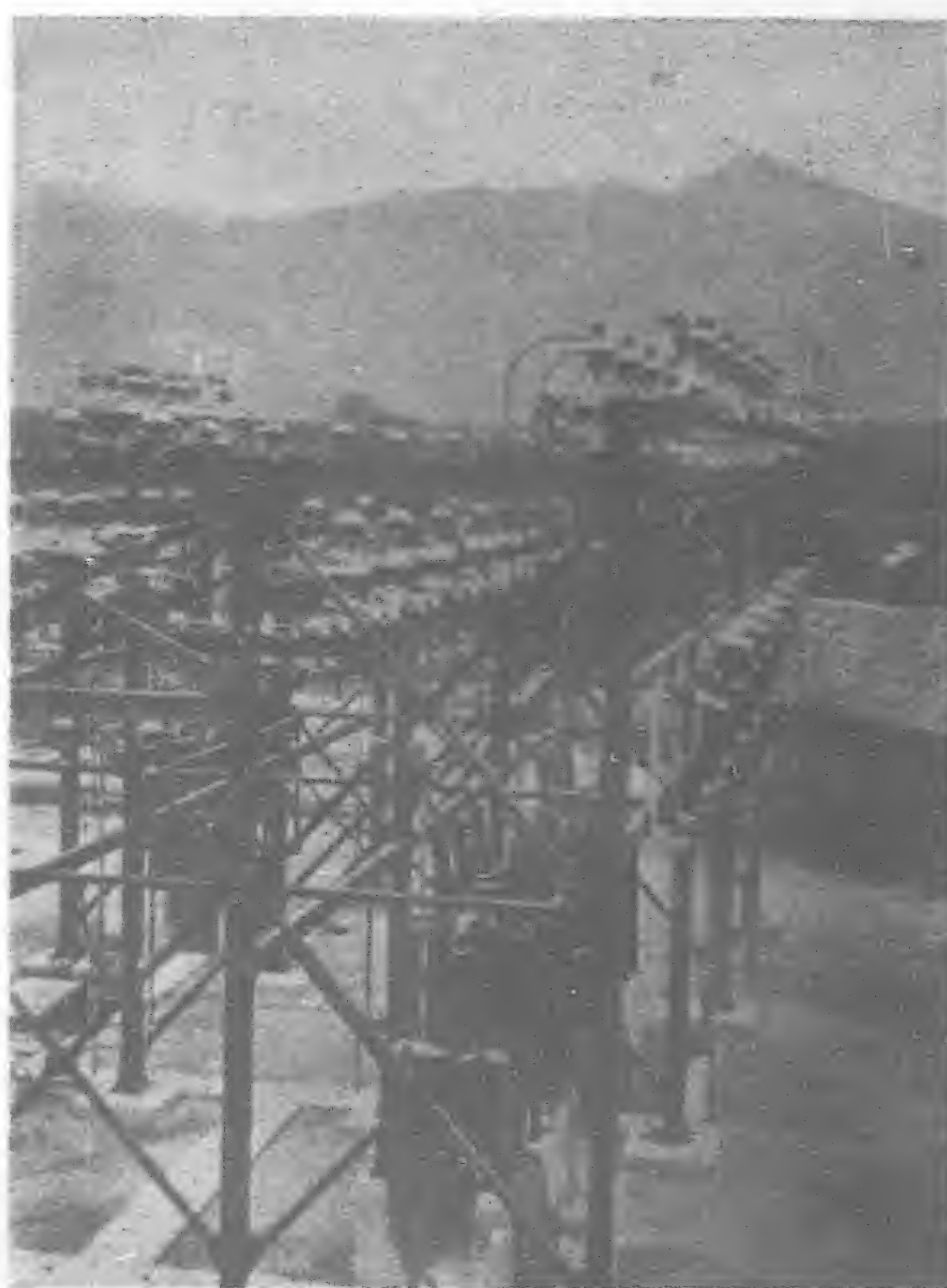
It is expected that a future feeder will be taken from the 22 kV bus structure for a supply to Tambun, a small town some six miles east.

The 3,000 kVA transformer bank feeds a set of 6.6 kV busbars housed in a bank of outdoor weatherproof steel cubicles. From these bars there are four outdoor overhead feeders, each of 1,000 kVA for local distribution. In the same bank of steel cubicles are housed a 50 kVA, lighting transformer and a three-phase potential transformer. An extension cubicle contains the necessary isolators to enable additional cubicle units to be added and put into commission without any interruption in supply. Similarly, the 22 kV bars are fitted with isolators in provision for the same ease of extension.

The power transformers are of special design, and consist of single-phase transformers with one spare transformer per bank. The delta is on the H. T. side. The star point is available, and the connection from it is passed through an isolator and, in the case of the 3,000 kVA transformer, is taken to a resistance of 11.5 ohms and "earthed". In the case of the 5,000 kVA transformer, the connection, after the isolating switch, divides into two parallel paths—one through a S.P. oil circuit breaker and a Peterson coil to "earth," the other through a S.P. oil circuit breaker and an earthing resistance of 101 ohms to "earth."

The equipment at Talang Pamaya is the same as that at Selibin, with the exception that there is only one bank of power transformers. This is of 10,500 kVA capacity and steps down from 66 kV to 22 kV at which pressure it supplies a single bus structure. To the bars of this structure there is coupled the other end of the ring main from Selibin, and also, from the same structure, there are two parallel outgoing feeders of 0.1 sq. in. stranded copper cable taking the supply overhead to Tanjong Tualang six miles south.

For the outdoor equipment at both Selibin and Talang Pamaya, a desk type switchboard houses the controls, instruments and protective gear, and is of



Part of Chenderiang Station Complete



General View of Temoh

the same pattern as that at Malim Nawar. An M-G set is run from a service transformer which is 50 kVA and supplied from the 6.6 kV bars at Selibin, and 30 kVA and supplied from the 22 kV bars at Talang. These sets supply lighting, power plugs and battery charging, etc. The battery in both cases is 60 cells-110 volts-for oil circuit breaker controls and signal lamps. The desk board, M. G. set, a.c. and d.c. control panels and lighting distribution board are all situated in the operator's control cabin.

The three stations at Kampar, Temoh and Chenderiang are on the 22,000 V. lines from Malin Nawar. Temoh and Chenderiang are each equipped with one three phase 1,500 kVA transformer bank, but at Kampar there are two three-phase transformer banks, each 2,250 kVA.

All the H. T. gear is of the outdoor type and the 6.6 kV gear is mounted in weatherproof steel cubicles. These cubicles are arranged in units; each unit to control either an out going or incoming feeder or service and potential transformers equipments. Steel barriers divide the units into a series of chambers for oil circuit breaker, isolating switches, busbars, etc. Each chamber has its own door with independent lock thus forming a series of inner doors. In addition, there is an outer door, front and back, of each unit; and the units are all bolted together to form a compact cubicle bank which, by special provision, is made perfectly weatherproof. From each of these L. T. cubicle banks at all three stations there are four outgoing overhead local feeders, each of 1,000 kVA. At both Chenderiang and Temoh there is, in addition to these feeders, one 22 kV outgoing overhead feeder to Mr. Choo Hoy's mines. That from Temoh is rated at 1,500 kVA., while that at Chenderiang has an initial capacity of 750 kVA., to be increased later to approximately 2,000 kVA.

The Chenderoh hydro-electric station is situated on the West bank of the Perak River some 60 miles North of Malim Nawar. This will be the main supply station and will feed directly through to the steam station. The official opening is expected to take place early this year.

The plant consists of three main generator sets driven by water wheel turbines. The capacity of each set is 11,250 kVA, and coupled to each is a bank of three single-phase transformers of approximately 11,000 kVA three-phase. The generator pressure is thus stepped up from 6,600 to 66,000 volts.

The transformer banks are part of the outdoor equipment and feed a double bus structure of 66 kV bars. With the exception of the ring main between Selibin and Talang Pamaya, these 66 and 22 kV feeders are run in duplicate and it has therefore been possible to provide instantaneous differential protection on these main feeders.

The protection of the generators and transformers at Chenderoh is provided by the Merz-Price circulating current system. Protective current transformers coupled to the same pilot wires are also put in the leads of the 100 kVA service transformers, thus ensuring stability of the Merz-Price system when the service transformers are overloaded.

Between the earth and the neutral point of the generators, a voltage transformer is connected so that, in the event of an earth occurring in the machine windings, or in the L.V. windings of the step up transformers, an E.M.F. will be impressed across the primary. The secondary winding operates a type "FS" relay. To protect against any high frequency voltages which may build up across this transformer, a spark gap and resistance is connected in parallel with the transformer primary winding.

Core balance earth leakage protection is provided for earth faults within the H. V. windings of the main power transformers.

This involves four current transformers, and is arranged to operate the middle pole of the type "FSM" relay which will open the main oil circuit breaker and generator field switch. The two outer poles of this relay are operated by the Merz-Price gear. In addition, there is overload protection provided by three pole type "PB" relays, which have inverse and definite minimum time characteristics.

The differential protection at the Chenderoh end of the line consists of two single pole type "PD" relays; one being operated differentially from the current transformers in the red phase of each of the two outgoing lines, and the other by those in the blue phase. A third "PD"

relay is operated by two sets of core balance current transformers, one set on each feeder. Thus, it will be seen, there is complete differential overload, and sensitive earth leakage protection on the two outgoing feeder lines.

In addition, "PB" relays are provided, one for each line, the two outer poles being connected for overload and the middle one for earth leakage.

At each of the stations—Selibin, Talang Pamaya, and Malim Nawar—the two 66kV. incoming feeders from Chenderoh are fitted with differential directional protection. This takes the form of type "ND" relays; two connected, in a manner similar to the "PD" relays at the hydro station, for overload protection, and a third for earth leakage.

These relays, having directional element require a potential supply. In the case of the phase fault relays, this potential is supplied by two single-phase 22,000-110 volt potential transformers, connected in open delta, and fed by the L.V. side of the power transformer. In the case of the leakage relay, 66 kV. oil-immersed condensers are required to supply the potential. These have been specially designed for the purpose, and are fitted with 88 kV. voltage tap condenser bushings.

At these stations, there are also standby type "PB" overload and earth leakage relays for single line operation since, in this event, the directional differential protection is made inoperative.

The operation of this differential protection is such that, in the event of a phase fault on, say, the No 1 line between Chenderoh and Selibin, the fault current will flow from Chenderoh along the No. 1 line direct to the fault, and along the No. 2 line through the Selibin busbars, and back along the No 1 line from Selibin to the fault. The relative magnitudes of the fault currents in these two lines will, of course, depend upon the exact position between the two stations at which the trouble occurs.

The "PD" overload relay on the No. 1 line will operate to trip the oil circuit breaker on that line, and at the same time the "ND" directional overload relay at Selibin will operate to trip out the oil circuit breaker on that end of the same line; since, it will be observed, there will be a reversal in the direction of the current through No. 1 line from Selibin to the fault. Switches at Talang Pamaya and Malim Nawar would then operate in turn and the faulty section of the line would thus be isolated, while the healthy feeder remains in operation.

Should an earth fault occur and last long enough to bring in the earthing resistance across the Petersen coil, the "PD" leakage relay will operate at Chenderoh and the "ND" leakage relays at Selibin, Talang Pamaya and Malim Nawar, and isolate the earthed section.

This same differential and directional protection is applied to the duplicate 22 kV. lines between Talang Pamaya and Tanjong Tualang, and those between Malim Nawar and Kampar, Temoh and Chenderiang.

The protection for the power transformers at all stations is the standard Merz-Price circulating current system, with standby "PB" overload relays.

At the Malim Nawar station the protection is directional differential phase fault and earth leakage for the incoming lines, with standby "PB" relays; differential "PD" relays for the outgoing lines to Kampar, and Merz-Price for all power transformers and generators.

In addition to the above there is a system of bus structure earth leakage protection installed. This takes the form of a bushing type current transformer connected in the earth lead from the structure to the earth plate. This current transformer operates

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Road Construction in Singapore

ROADS under the control of the Municipal Commissioners of Singapore have a length of 125½ miles, in addition to which there are 23 miles of back lanes.

In his report for 1928, the municipal engineer, Mr. David B. McLay, M.Inst.C.E., calls special attention to the large amount of work carried out on back lanes during the year, a total length of nearly 7½ miles being completed. This is more than double the mileage of 1927, which was a record greatly exceeding all previous years. Despite this largely-increased mileage, the arrears have not wholly been overtaken, and efforts are being made this year to wipe out these arrears and meet the increasing demand for back lanes as new buildings are constructed.

Road Reconstruction

Mr. McLay states that, with the exception of one short section, the reconstruction of the trolley-bus routes was completed about eight months in advance of the stipulated time.

In addition to completing the trolley-bus routes, a considerable amount of reconstruction work was carried out on other main thoroughfares. Work on these latter thoroughfares had been, to a great extent, suspended while the trolley-bus routes were being tackled, and Mr. McLay remarks that it is only fair to undertake reconstruction work in other widely-spread and heavily-trafficked areas. Funds for this program of necessary works have, however, been somewhat curtailed, and this fact alone has limited the output of work.

During the year under review, the amount of reconstruction was 110,546 sq. yds., as against 181,842 sq. yds. of road surface reconstructed during 1927, 196,896 sq. yds. during 1926, and 293,121 sq. yds. during 1925.

The average cost of the work was \$3.11 per sq. yd.

Experiments with Granite Dust

Experiments were carried out during the year with granite dust, which formerly had been looked upon as of very little value, and had been used only for spreading on asphalt-painted roads and filling where swampy land had been removed during the construction of new roads or reconstruction of existing roads.

Test slabs of concrete briquettes of mortar were made, and these were tested to destruction, and it was found that, contrary to expectation, the slabs and briquettes gave better results than similar slabs and briquettes made with ordinary coarse sand. As a result of these experiments, this granite dust is now used at the pipe-and-slab-making factory, and it has been used also with great success in concrete for bridges, retaining walls and other structures.

Construction Systems

During the year, the same mixtures as were turned out in 1927 were used in reconstructing the main roads, and asphalt macadam was also used with success on one thoroughfare and on certain of the second class roads in and around Chinatown.

Considerable use was made of concrete in constructing new roads in residential districts. This was particularly the case in a certain new area. It was desirable to provide the cheapest carriageway consistent with strength and economy so as to permit of the erection and letting of houses at low rental, and as this area had recently been filled in some cases to a depth of 3-ft. it was decided that a plain concrete slab 6-in. in thickness should be

provided. Transverse joints for expansion and contraction were provided at intervals of about 50-ft., and after the concrete had been matured, these joints were filled with a mixture of bitumen and sawdust.

High-early-strength Japanese cement was used in making the concrete, and the surfaces of the carriageways were treated with three coats of silicate of soda so as to harden the concrete and resist abrasion.

"It is anticipated," says the municipal engineer, "that these concrete carriageways will prove to be economical and enduring. They are easily kept clean, and, if the surface does not reflect the sun's rays too markedly, they should be very attractive in this new housing area. They are designed, however, only for light traffic, and steps must be taken to preclude the use of them by heavily-laden motor lorries and traction engines."

Rubber Block Traffic Lines

The use of white rubber blocks as a white-line marking was tried, and has proved satisfactory. These blocks are supplied by the Netherlands Rubber Works, Limited, and consist of a strip of white rubber about ¼-in. in thickness, fixed on to a thin slab of concrete or cement mortar. Two thicknesses of slab were tried, one of ¾-in. and the other 2-in., and it has been found that the thicker slabs are best suited for our purpose.

It is intended to try these white rubber lines in other locations, as so far, according to Mr. McLay, these give the most clearly-defined lines suitable for traffic regulation.

A curious local practice is referred to in the report. This is the spreading of sawdust on the carriageway to be dried by the sun's rays, even the roads in the immediate vicinity of the temporary municipal offices being used for this purpose. The material is employed in the storage of ice.

"From a health point of view," says Mr. McLay, "the use of the carriageway for drying sawdust must be most reprehensible and from the point of view of this department the carriageways are littered and made untidy, and this misuse of the municipal streets should be put down most rigorously. My experience has been that the only effective way to deal with the problem

is by a liberal use of the pressure flushing vans, but the offenders generally arrange to spread out their sawdust during the middle of the day, when the sprinkler vans have been withdrawn for the mid-day meal hour, and the sawdust is swept up and removed before the wagons are again on their rounds."

Road Damage by Heavy Traffic

Revisions which have recently been made of the orders and rules relating to traction engines and motor-cars are satisfactory so far as they go, says the municipal engineer, "but I regret," he adds, "that no alteration has been made in the definitions of heavy motor-cars and traction engines, nor was provision made for the prevention of overloading of vehicles. The result is that, as far as this department is concerned, no improvement has been effected, and it is impossible to prevent the overloading of vehicles which seems to be the practice of most owners of lorries let out for hire. Frequently one sees 1-ton lorries carrying up to three tons of produce or other goods and 3-ton lorries loaded with eight or nine tons of produce.



Type of Drains on Tanjong Katong Road, Singapore

"The present unsatisfactory conditions must lead inevitably to damage to the carriageway, but until a further amendment or revision of the orders or of the ordinance itself becomes effective, I am unable to restrict the use of municipal roads by such outrageously over-loaded vehicles.

Unappreciated Footpaths

Mr. McLay mentions that, whenever possible, the reconstruction of existing roads or the provision of new roads has included provision for foot passengers on both sides of the carriageway. So far, the majority of foot passengers have not realized the advantages of these footpaths. It is hoped, however, that the process of educating the public, particularly the sons of the soil, will continue and give the desired results. "Only when foot passengers confine themselves to the foot-paths provided for their convenience will it be possible to obtain the greatest use of the carriageway and prevent bad driving and lack of concern for others," says the writer of the report.

Drainage

During the year a total of 24½ miles of new drains were constructed. Many miles of drains not constructed were also schemed out and estimated for. Maps of the whole of the drainage of the city are in course of preparation.

The above total for new drainage includes 5½ miles of back lane drainage and, although practically equal to the previous year's large figure, it still leaves the position far from satisfactory.

The unsatisfactory state of the main drainage outlets was responsible for considerable local flooding and consequent inconvenience and annoyance during the year.

The nucleus of a labor force for attendance to tidal flaps, manholes, etc., was formed.

The Ikegai Ironworks of Tokyo

(Continued from page 84).

The petrol engine for railway car drive was adopted quite recently by the Imperial Government Railways of Japan for service on lines on which passenger traffic is small. Fig. 12 shows an example of a chassis of a car with a 35—40 B.H.P. petrol engine, such as are fitted on these cars. The equipment includes change gear, reversing gear, and silencer, which are mounted on one frame, and are arranged under the floor of the car, as may be seen in Fig. 11. The car has seating capacity for forty passengers, and a small luggage compartment. Manœuvring gear is provided at both ends of the car. Fig. 2 which is reproduced from a photograph taken after the conclusion of a successful trial, the railway officials and contractors are to be seen in front of the car. The bodywork was made by the Tokyo works of the Kishaseizo Kabushiki Kaisha.

The Ikegai Ironworks were also responsible for all the petrol-engined emergency dynamo sets of 40-kW capacity which are installed in the three new 16,000-ton, 20,000 H.P. Pacific liners of the Nippon Yusen Kaisha. Numbers of similar sets are under construction for additional motor liners projected by the Nippon Yusen Kaisha and the Osaka Shosen Kaisha. A similar emergency set is shown in Fig. 11, which was made for the Bureau of Communications. The generator has a capacity of 12 kW, and the petrol engine of 20 B.H.P.

Ikegai products are widely known in Japan by reason of their accurate and substantial construction, special attention being given to the importance of all possible reduction of weight, regard being had, of course, to the uses and purposes for which the machine is intended. A distinction of which the company is not a little proud is that it is not a licensee of any other concern's specialty, whether native or foreign, in relation to internal combustion engines, a position the more remarkable since it would be difficult to point out a maker in Japan who is not a licensee of some foreign firm. The company, it may be added, has taken out more than 100 patents.

The Managing Director of the Company is Dr. Makoto Saito (Engineer-Admiral ret.), while the Chairman is Mr. Shotaro Ikegai, the founder of the works.

Perak River Hydro-Electric Scheme

(Continued from page 90).

a type "PB" relay on which the required time setting is obtained. At Chenderoh this relay will close on to a tripping relay with six tripping contacts. Thus, in the event of a busbar fault at this station, the three main transformer breakers, the two outgoing feeder breakers, and the bus coupler breaker will all be tripped out simultaneously.

At Malin Nawar the arrangement is slightly different. There it is the intention to isolate the 66 kV. bars only at first, and maintain the supply from the steam plant to the 22 kV. bars; the latter to be isolated if the fault continues. This is obtained by the "PB" relay operating directly a tripping relay with three trip contacts to open the two 66 kV. line breakers and the H.T. transformer breaker. The opening of the latter is made to close a pair of auxiliary contacts which put the "PB" relay on to a second tripping relay fitted with two trip contacts to open the breakers on the H.T. side of the 22-6.6 kV. transformers, and thus isolate the 22 kV. bars.

It will be clear that if the fault is only on the 66 kV. bars, the closing of the "PB" relay on to the second tripping relay will be ineffective, since the opening of all the 66 kV breakers will isolate the trouble and stop further current passing through the earth transformer.

A similar arrangement is installed in Selibin, where it is required to maintain the supply on the 6.6 kV bars when a fault occurs on only the 22 kV bars. At all other stations, the earth fault is made to trip out all breakers on the busbars.

For the protection of the 6.6 kV cubicle busbars, a bushing transformer is connected in the neutral earth lead of the L.T. windings of the power transformer. This operates a "PB" relay, as in the former case, to open the affected oil circuit breakers.

All the outdoor sub-station structures are flood-lighted at night. Metro-Vick Supplies were responsible for the flood-lighting installation, which consists of 15 feet tubular steel poles at the top of which are mounted double parabolic reflector type projectors, fitted with high power gas filled lamps. Each pole carries its own control switch, mounted well out of reach near the top of the pole and operated by a stick. The master switch and fuses for the full equipment, is of course, mounted on a control panel in the switch house.

Anglo-American Excavator Combination

THE organization of Ruston-Bucyrus, Ltd., a combination of Ruston & Hornsby, Ltd., of Great Britain and the Bucyrus-Erie Company of the United States marks an important new development in the excavator business throughout the world. The new company will include the two principal manufacturers of excavators and will place at their disposal the unrivalled facilities of each of these companies.

For over 50 years Ruston's have been Excavator specialists, and the principal constructors of this class of machinery in the British Empire, while Bucyrus-Erie are the World's largest builders outside the British Empire and their Mechanical Excavators are in very large demand in U.S.A. and other parts of the globe.

The contribution of Ruston & Hornsby Ltd. to Ruston-Bucyrus Ltd. will be their Excavator business, including the whole of the Excavator Works and organization. Bucyrus-Erie Company Limited will contribute an equivalent value in cash and will transfer to the new Company the whole of their interests in countries outside North and South America, Japan and China.

Provision has been made for the maintenance of equality of capital holding and Directorate representation of the respective Companies. As regards capital there will be no public issue.

The first Directors of the new Company will be Col. Joseph Seward Ruston, George R. Sharpley, John H. W. Pawlyn, Victor W. Bone, Lieut. Col. P. D. Ionides, Sir Archibald Ross, Roger W. Newberry, and William W. Coleman.

Mr. Coleman, who is President and Chairman of the Board of Bucyrus-Erie, will be Chairman of the Board, Col. Ruston, Chairman of the Board of Ruston & Hornsby Ltd., will be Vice-Chairman, Mr. Victor Bone, now Director of Works of Ruston & Hornsby Ltd., will be Managing Director, and Mr. Newberry, now Manager of Foreign Sales of Bucyrus-Erie Co., will be Director of Sales.

Engineering Notes

ELECTRIC LIGHT, POWER AND TRACTION

SOUTH MANCHURIA RAILWAY CO., LTD.—The South Manchuria Railway Co., is planning to build a new power station No. 3 at Cheefun in South Manchuria, with a capacity of 30,000 k.W.; with an estimated cost of probably Y.4,500,000.

UJIGAWA DENKI K.K. (The Ujigawa Electric Co., Ltd.)—The Kitakamigawa Hydro Power station with 10,000 k.W. capacity, of the Ujigawa Denki K.K., which has been in the course of construction will most probably be completed by the coming Spring and under the circumstances in furtherance of their scheme the company is planning to develop four suitable places on the Kitakami River in Naga Prefecture.

TOKYO DENTO K.K. (The Tokyo Electric Light Co., Ltd.)—The Tokyo Dento K.K. is at present surveying a point 15 miles from Suikaido Switch Station in Ibaragi Prefecture, for the purpose of building, according to a report, 66,000 volt transmission line between Suikaido Switch Station and Ryugasaki Substation, soon after the completion of survey. However it will not be before March or April next before they will start construction. On the completion of above work, the company will endeavor to increase the consumption of electric light and power in that part of the country where their interest lies.

ELECTRICITY ON THE WUTAO GROUP.—The Wutao (Five Islands) Group, often called "Fengmingtao," 30 miles off the coast of Pusan, is inhabited by 10,000 Chinese and over 60 Japanese, the majority of whom are engaged in manufacture of salt.

On one of the group known as Chiaoliutao Island, the Japan Salt Manufacturing Co. keeps a sub-branch office.

With the support of Kwantung Government, a wireless equipment is to be installed on the premises of the Salt Company's sub-branch on Chiaoliutao Island to connect with the Dairen Wireless Station.

This plan has been approved of by Kwantung Government, and work will be finished during next February.

Through the good will of the General Post Office, Dairen, the company's sub-branch is to be lighted with electricity.

HITACHI SEISAKUJO K.K. (Hitachi Engineering Works Ltd.)—There has been a greatly increased demand for electric light and power in Kyushu, the district in which the Toho Denryoku K.K. has been supplying hitherto, and in order to meet this demand the company is intending to extend the Najima Steam Power Station to 50,000 k.W. and build several hydro power stations in Saga prefecture.

The company will decide during August as to the nature of equipment for the Najima station, but as to the following hydro-power stations not only the details of equipment have been decided upon, but orders have been placed with the Hitachi Seisakujo K.K., they are as follows:

Itsukigawa Hydro Power Station.
3,125 k.V.A. Automatic Generator, 2 units.
Single Vertical Water Turbine, 350 h.p., 2 units.

2,100 k.W. transformer, 3 units.
Distribution Board.

Tamashimagawa Hydro Power Station
2,900 h.p. water turbine, 1 unit.
2,500 k.V.A. generator, 1 unit.
850 k.W. Transformer, 3 units.

Hirotaki Hydro Power Station,
1,000 k.V.A. Automatic Generator.

INDUSTRIAL

ONODA SEMENTO K.K. (The Onoda Cement Co., Ltd.)—The Onoda Cement Co., is now planning to build a 4,000 k.W. steam power station in Shoshutenson, Korea.

According to the report, the company will build a cement mill at Gyurori, Kokeiri, Sori in Korea. The daily production is estimated at 1,700 barrels.

ANZAN BLAST FURNACE NO. 3.—The new Blast Furnace No. 3 of the Anzan Iron & Steel Works, Anshan, having been completed and the first fire was built in the grate on February 15.

SHOWA HIRYO K.K. (The Showa Fertilizer Co., Ltd.)—The Showa Hiryo K.K. seems to have decided to install an equipment for fixing nitrogen in their Tsurumi Sulphate of Ammonia Mill for according to report the company will buy Chrode's and Linde's 3,000-cu. ft. Nitrogen fixing machine.

NEW GAS COMPANY IN TOKYO.—The promoters of the Tokyo Suburban Gas Company project will push their campaign under the leadership of Mr. Otohiko Ichiki who has been elected chairman of the committee of promotion consisting of leaders in the 105 towns and villages to be served by the prospective utility enterprise. The undertaking will have capital stock of \$60,000,000 of which one-quarter will be paid up. The application for a Commerce and Industry Department charter has been filed.

ASANO ZOKENJO K.K. (The Asano Ship Building Co., Ltd.)—A report is current that the Asano Zosen Jo will extend its steel manufacturing factory during the course of 1930. The company has already applied to the Department of Commerce and Industry for license to build a 300 tons Melting furnace, and it is rumored that it is already inviting estimates from the Machine makers, as well as an estimate for a rolling mill for medium sheets (approximate thickness 1.5 mm.).

OGURA SEKIYU K.K. (The Ogura Petroleum Co., Ltd.)—Yokohama Seiyujo (Refinery) of the Ogura Sekiyu K.K., which is situated at Moriya Machi, Kanagawa Ku, Yokohama, has been completed recently. The mill occupies an area of 15,000 tsubo, and had already four vacuum distillery apparatus and a machinery for manufacturing oil from raw material, and the company is making arrangements for installation of other necessary machinery, such as for the manufacture of volatile oil.

NISHIJIMA HENATSUKI K.K.—(The Nishijima Transformer Co., Ltd.)—The Nishijima Henatsuki K.K. has been planning for some time the extension of its mill and recently it succeeded in acquiring a part of the transformer factory belonging to the Naigai Dennetsuki K.K. (Naigai Electric Heater Co., Ltd.). According to a report, the company bought the transformer factory of 2,000 tsubo for Y.200,000. Up to the present the company has been making up to 1,000 k.W. transformer, but in future it will be able to make up to 5,000 k.W., thus quadrupling the manufacturing capacity. It is also reported that the company will probably organize the Naigai Henatsuki K.K. (Naigai Transformer Co., Ltd.) with a capital of Y.500,000, forming two section of transformer department and Electric Heater department.

MITSUMI KOZAN K.K. (The Mitsui Mining Co., Ltd.)—The Omuta Mill of the Mitsui Kozan K.K., has already bought a manufacturing machine with several compressors and accessories for the production of sulphate of ammonia, but they have not yet decided as to the choice of the principal machines. The company will buy a gas generating apparatus and a holder during the course of this year, the latter with a capacity of 1,000,000 cu. ft. and will be chosen from one of the home products.

It is reported that the company will probably buy Kraiser's (phonetic) gas generating apparatus from the Mitsubishi Shoji K.K.

MITSUBISHI SHOJI KAISHA HAS FURTHER STEEL RIGHTS.—The Mitsubishi Shoji Kaisha has acquired the sole sales right of steel angles produced by the Japan Steel Tubing Company to which it is closely related. The Japan Steel Tubing has a sales company devoted exclusive to rails and tubings and it is directly selling round steel to wholesale companies. The Mitsubishi interests have thus got a wider scope of activity in the steel business than before.

The Mitsui Bussan Kaisha maintains the Japan Steel Manufacturing Company's Wanishi Works under its direct control on the pig iron production and also its Kamaishi Works on the steel production. All these products are sold by the Mitsui Bussan Kaisha. The Mitsubishi maintain the Mitsubishi Iron Manufacturing Company having works at Kenjiho in Korea but have no steel manufacturing company at present.

S.M.R. GIVES BIG ORDER TO YAWATA.—The South Manchuria Railway Company has given a Y.3,000,000 business to the Yawata Iron Works for 30,036 tons of heavy rails, splice bars and nutlocks. This award has been given to the Government works in heavy competition with foreign suppliers.

The business comprises 75 miles of 100 pound rails, and 125 miles of 80 pound rails, at an average price of Y.92; splice bars and washers at Y.125. It is remarked that the experience of the South Manchuria Railway Company shows that the products of the Yawata plants compare very favorably with those of first class manufacturers of Europe and America.

This patronage of the Japanese rail making plant in preference to the competitors from foreign countries is stated to be a significant move of the big railway enterprise under the new régime of Governor Mitsugu Sengoku who, it is remarked, is going to put into the discard the past relations of the company with many suppliers of materials. Hereafter business from the S.M.R. will be flowing to the suppliers, home ones preferred in particular, who can give best prices when other considerations are on the par. The order calls for delivery March to June and takes care of the entire section needs of the South Manchuria Railway Company for the 1930 fiscal term.

The officials of the Yawata Iron Works are naturally elated at the result of their sales efforts and consider it as an important driving wedge into its overseas steel activity. Since Manchuria admits rails and accessories free of duty and is considered as one of the important world's dumping grounds for the commodity, Yawata's entry in earnest into this already well congested field will be the sign for a renewed international rivalry in steel selling. The claim is made that rails supplied by the Yawata works have withstood the test in S.M.R. lines the best as evidenced by the fact that not a single section has been discovered to have broken which has not been the case with rails supplied by other makers.

RAILWAYS

RAILWAY ON SAKHALIN.—The construction of the first railway on Sakhalin Island and the building of a new port at Alexandrovsk, Sakhalin, of the type of Portland, Oregon U.S.A., will commence during February. American engineers are proceeding for this purpose from the United States to Alexandrovsk. These engineers have taken part in the rebuilding of the Portland port in 1909-1910.

NEW HSIACHIUTAI-YAOMEN LINE.—Gov. Chang Tso-hsiang has decided to build a new railway from Hsiachiutai on the Kirin-Changchun Line to Changchiawan or Yaomen on the C.E.R. Southern Section, and to have instructed Chief Engineer Chang Kuo-hsien to prepare estimates therefor in secret.

The new Hsiachiutai-Yaomen line will be 80 odd Chinese "li" long and will cost \$3,000,000 in Kirin large dollars. For surveys and construction, the experts of the Kirin-Hailungcheng Line are to be employed. The construction is to be finished within 4 months after the work is started.

CANTON-HANKOW LINE WILL BE COMPLETED.—It is announced at the Ministry of Railways that with surveying of the Chuchow-Shiuchow section of the Canton-Hankow Railway completed and the impending issue of the Canton-Hankow Railway Reorganization Loan, construction of this unfinished section of the line will be started this year. The Ministry of the Interior has notified the provincial governments of Kwangtung, Hunan and Hupeh that any land taken from private owners for the laying of the tracks and other purposes will be paid for by the Government.

JAPANESE RAILWAYS PLAN TO ELECTRIFY ROUTES.—The Japanese Government Railways is planning to electrify portions of the Government road, between Tokyo and Yokosuka, Kozu and Atami, Ueno and Abiko, Yokohama and Hachioji, Tachikawa and Asakawa, Kyoto and Nara, Tennoji and Umeda, and Otsu and Akashi.

To that end, a special committee in the Railway Office is working out the details of the plan, which when it materializes, is expected to react considerably on the passenger traffic of the existing interurban lines operating in and around the Kanto and Kansai districts.

Among the principal lines expected to be more or less affected by the proposed plan of the Government Railways are the Keihin Densha, Shonan Densha, Tsukuba Rapid Transit, Tobu Tetsudo, in and around Tokyo; the Hanshin, Hankyu, Keihan, Shinkeihan, Daiki and Nara interurbans in and around the Kansai district.

Of the proposed electrified routes, the sections between Tokyo and Yokosuka and between Kozu and Atami have already had overhead wires installed.

PUBLIC WORKS

LARGEST LIGHTHOUSE IN CHOSEN.—The wreck of the s.s. *Siberia Maru* on the Moji-Dairen line off Oyake Island, one of a group of islands known as Daikokusan Gunto, last summer, struck shipping circles so much that the Government of Kwantung Leased Territory, the Osaka Shosen Kaisha, and the Japan Seamen's Union approached the Overseas Affairs Department as well as the Government-General with a request to erect a lighthouse there, and the Communications Bureau decided to erect one on Koe Island, thirty nautical miles off Oyake Island, at a cost of Y.200,000 to illuminate an area within a radius of thirty nautical miles and equipped with a fog signal and radio apparatus. It is claimed it will be the largest lighthouse in Chosen.

NEW WHARVES TO BE GIVEN SHANGHAI.—New wharves and godowns to provide additional shipping facilities in the port of Shanghai will be built in the district between Woosung and Yangtzepoo, center of the proposed Greater Shanghai city, according to plans formulated by the harbor bureau of the special municipality of Shanghai.

An extension of the Shanghai-Nanking railway line to the new center will also be constructed so as to facilitate transportation of cargo direct from steamers to railway wagons.

CONSTRUCTION OF HAKATA HARBOR, JAPAN.—According to a report from Consul Henry B. Hitchcock, at Nagasaki, the improvement of Hakata Harbor (Fukuoka) is now under way. The difficulties in the way of the project have been not so much technical as financial, and while it is said that no real construction work can be undertaken until larger funds are available, the assignment of engineers to the work by the home department and the surveying now being undertaken indicate that the project is ultimately to be carried through. The work at present contemplated involves the building of a break-water 750 feet long (finally to be nearly 4,000 feet long), considerable dredging to clear a depth that will permit vessels of 10,000 tons to enter, and some filling in. In addition, it will be necessary to construct a relatively large number of caissons for the foundations.

AMBITIOUS PLANS FOR RECONSTRUCTION OF NANKING.—Plans for the reconstruction of the capital into a most-up-to-date city have been drawn up by the Metropolitan Reconstruction Commission. According to these plans the work of the remodelling of Nanking into a modern city is to be completed within a period of ten years. The following is the estimate of the funds to be devoted for construction purposes:

	Tls.
The Historical Museum and the temple for the sages	500,000
The Kuomintang Headquarters	10,000,000
The Central Library	2,000,000
The Central College of Arts	2,000,000
The Administrative Council and the Chief Executive Office	8,000,000
The Supervisory Council	2,000,000
The Examination Council	2,000,000
Each of the 8 Ministries	500,000
The Memorial Pagoda	2,000,000
The Gate of the Nation	500,000
The Aerodrome	1,000,000
Road building	40,000,000
Draining system	2,000,000
Total	80,000,000

HULUTAO HARBOR.—A petition recommending the immediate starting of conservancy work on the upper reaches of the Wei Ho, the main east-to-west waterway in Shensi, by the Central Government has been jointly submitted to the Executive Yuan by the Shensi Guilds in Peiping and the Capital. The proposal recommends that a sum of \$2,000,000 from the returned Boxer Indemnity Fund should be reserved for meeting the conservancy expenses and that the famine refugees and the unemployed in Shensi be mobilized for the construction work. The memorandum has been referred to the Ministries of Communications, Finance and Railways for joint consideration.—*Kuo Min.*

Work on the construction and expansion of Hulutao, island off the eastern coast of Liaoning, near the Gulf of Liaotung, into a modern commercial center, will be started in the next month, according to a plan formulated by the North-Eastern Communications Committee. The completion of the proposed construction works, it is expected, will greatly facilitate shipping and export of the special products of Manchuria and Mongolia.

The Committee is also understood to be considering the development of the harbor of Newchwang and the building of wharves, godowns and other shipping facilities there. Surveying of the harbor has already been started and construction is expected to be commenced in March.

A motor-road of about 480 li (160 miles) in length connecting Heiho, on the North-eastern Heilungkiang border, and Nunkiang, an important city east of Tsitsihar, was recently completed by the Heilungkiang Provincial Department of Reconstruction and will shortly be opened to traffic.—*Kuo Min.*

SHIPPING AND SHIPBUILDING

JAPANESE MOTOR SHIP PROGRAM.—According to reports received, the Mitsui Bussan Kaisha, which owns eight motor ships and nearly 40 steamers, proposes to replace the steamers by motor ships within the next 10 years. The programme, which is at present tentative, involves the construction of several oil-engined vessels of large size for the Pacific route and a number of smaller ships for the Chinese coastal service.—*Motor Ship.*

SMALL VESSEL FOR THE EAST ASIATIC COMPANY.—The East Asiatic Co. has ordered from the Naskov shipyard a passenger-cargo vessel of 3,200 tons d.w.c. High-speed twin-screw Burmeister and Wain machinery will be installed totalling 3,000 i.h.p. The engines will be of the trunk piston type and will be supercharged, running at 170-175 r.p.m. for full output. They will have six cylinders each, 500 mm. diameter, with a piston stroke of 900 mm.

The length of the ship b.p. is 330-ft., the breadth 48-ft. 9-in. and the depth 29-ft., the draught loaded being 17-ft. 3-in. The cubic capacity (bales) is 200,000. There is accommodation for 12 first-class, 22 second-class passengers, and 1,200 coolies can be carried.—*Motor Ship.*

TWO N.Y.K. MOTOR LINERS.—Two motor vessels under construction for the Nippon Yusen Kaisha, the *Hikawa Maru* and the *Heian Maru*, were launched recently. The former is being built by the Yokohama Dockyard, where a sister ship is under construction. The *Heian Maru* has been launched by the Osaka Shosen Kaisha, and both vessels are 510-ft. long, with a beam of 66-ft. and a depth of 41-ft. The draught is 30-ft. 2½-in. Double-acting four-stroke machinery built at Copenhagen by Burmeister and Wain will be installed, comprising in each case two engines developing a total of 11,000 b.h.p. They have eight cylinders, 680 mm. bore with a piston stroke of 1,600 mm., and run at 110 r.p.m.

The *Hikawa Maru* will be placed on the N.Y.K.'s Seattle-Orient service, and the *Heian Maru* will trade on the Orient-California-South American West Coast service. Both ships will maintain a speed of 16 knots.—*Motor Ship.*

NEW ORIENTAL MOTOR CARGO VESSEL "KOTA PINANG."—On November 23 the motor cargo vessel *Kota Pinang*, building for the N. V. Rotterdamsche Lloyd, was launched from the yard of the Netherland Shipbuilding Company (Nederlandsche Scheepsbouw Maatschappij), at Amsterdam.

The principal dimensions of this vessel are as follow:—

Length overall 464 feet 6 inches; length between perpendiculars 448 feet 4 inches; breadth 60 feet 6 inches; and depth 33 feet 6 inches. The carrying capacity is 2,500 tons.

The ship is propelled by a "Fyenoord M.A.N." motor of 5,200 b.h.p., giving the speed of 14½ miles on her trial trip. Although a cargo vessel, the *Kota Pinang* has a small accommodation for passengers, consisting of a dining saloon, a smoking room, and nine staterooms with two berths each. Further, the vessel has been arranged for the carriage of about 2,000 pilgrims.

TWO JAPANESE CARGO SHIPS.—The Toyo Kisen Kaisha and the Yamamoto S.S. Co. have both ordered a motor cargo ship in which will be installed a 2,700 b.h.p. Sulzer-type engine with cylinders 680 mm. bore and a piston stroke of 1,200 mm. The engine for the first-named company's ship will be built at the Kobe Steel Works and the machinery which is to be installed in the Yamamoto Co.'s vessel will be constructed at the Mitsubishi Dockyard.

TELEPHONE, TELEGRAPH AND RADIO

VLADIVOSTOK.—It has been decided to build a new big automatic telephone station in Vladivostok to replace the old one which can no longer satisfy the growing needs of the city. The new telephone station will accommodate not only Vladivostok but the surrounding districts up to Nikolsk Ussurisk.

NEW ANGLO-JAPANESE DIRECT WIRELESS COMMUNICATIONS.—Heretofore, a cable between Japan and Great Britain has required at least three hours for transmission, because of its having to be put through a medium station.

The Japan Wireless Co. has installed the short-wave dispatching appliances of the R.C.A. system in the Despatching Station in Aichi Prefecture which carries on wireless traffic with Europe exclusively, while the Receiving Station at Yokkaichi in Miye Prefecture has been equipped with the Beam receiving appliances of the Marconi system. A trial operation carried out at each station early this year having proved satisfactory, the long cherished hope to open direct Anglo-Japanese wireless communications was inaugurated on January 26.

Under the new arrangement, a cable between the two countries can be transmitted in only about half an hour.

FEDERAL WIRELESS CONTRACT CANCELLED.—Notice of cancellation of the wireless agreement concluded between the Federation Wireless Company of America and the former Chiaotungpu in Peking, was served on the American firm on December 24. The communication was issued by the commission recently organized by the Chiaotungpu for the purpose of negotiating with the foreign concerns affected for the revision of their cable contracts with the Chinese government.

So far as can be ascertained, the letter requests the American company to send delegates to Nanking to enter into negotiations with the commission. It is stated that in the forthcoming negotiations the government will insist on the elimination of all features from the old agreements that are considered as "unequal" so that the right of international communication may be restored to China.

CHINESE GOVERNMENT TO ESTABLISH GIANT RADIO STATION.—According to the "Central Daily News," the official organ of the National Government, Mr. Chuan Chi-huan, Director-General of Telegraphs and Telephones of the Ministry of Communications, stated that the National Government, on December, 1929, officially informed the Great Northern, the Eastern Telegraph and the Commercial Pacific Cable companies the decision of the Chinese Government not to renew its contracts with the above companies upon their expiration.

The new powerful radio stations to be erected by the National Government will take care of communications between China and foreign countries after December 31, 1930. The stations at Shanghai are to be completed within six months and those at Hankow, Tientsin and Canton at the end of this year. The Ministry of Communications is stated to be floating \$10,000,000 Communications bonds. The sum of \$4,000,000 will be used for the payment of China's debts to the Great Northern and Eastern Telegraph

Companies, \$3,000,000 for the completion of the new radio stations, and another \$3,000,000 for the re-organization of the country's telegraph systems.

Arrangements have been made with the Telefunken interests of Germany for the transmission of radio pictures between China and Germany. If the experiments prove successful, the Ministry of Communications will sign a contract with the above firm for the introduction of radio pictures into this country. As the National Government has been depending almost entirely on foreign countries for its wireless materials, a work-shop for the manufacture of wireless materials has been started. The experiments, it is stated, have been quite satisfactory.

RADIO STATION TO BE BUILT AT CHARHAR.—In view of the importance of national defence in Mongolia and Tibet, the Ministry of Communications is preparing to construct a radio station in Charhar in order to facilitate transmission of official reports from the northern frontier to the Central Authorities.

ROADS

KIANGSI ROADS.—The surveys for the proposed four main highways of Kiangsi province radiating from Nanchang, the Provincial Capital, has been completed, according to an announcement made by the Provincial Reconstruction Department for Kiangsi. The roads include the Nanchang-Tayu section of the Kiangsi-Kwangtung Inter-Provincial Highway;

Nanchang-Yushan section of the Kiangsi-Chekiang Inter-Provincial Highway;

Nanchang-Linchuan section of the Kiangsi-Fukien Inter-Provincial Highway and, the

Chingteh-Hukow motor road. The total mileage of the four roads, construction of which will be immediately started, is estimated at approximately 630 miles (1,780 li).—Kuo Min.

SUIYUAN ROADS.—Plans for the construction of a network of thirteen motor roads linking a number of the more important and populous districts in the province of Suiyuan with a total mileage of about 940 miles as a means of providing employment for the large number of able-bodied adult famine refugees in the Northwest as well as to facilitate communication in the province, have been announced by the Suiyuan Provincial Department of Reconstruction. The total construction cost is estimated at about seven hundred thousand dollars (\$700,000) which, it is hoped, will be appropriated by the Central Government in accordance with the petition of the Provincial Authorities.

Following is a list of the proposed roads, their lengths and the estimated cost of construction:—

Name of Highways	Length	Cost of Construction
Paoning Highway	... 520 li	\$112,320
Suihsin Highway	... 540	131,240
Suitsing Highway	... 240	86,400
Paokoh Highway	... 350	75,600
Tungtien Highway	... 20	4,120
Kweiwu Highway	... 90	19,440
Taotsoh Highway	... 70	5,120
Lungwu Highway	... 350	85,680
Suijen Highway	... 125	27,100
Tsohliang Highway	... 170	36,720
Kupao Highway	... 140	30,240
Wuku Highway	... 142	30,672
Wuniao Highway	... 50	10,800

Total Length ... 2,807 li Total \$665,352

—Kuo Min.

NEW INTER-PROVINCIAL HIGHWAYS.—The construction of four new Inter-Provincial Highways to facilitate communication between the province of Chekiang and the provinces of Anhwei, Kiangsi and Fukien during 1930 is provided for in the program of the Chekiang

Provincial Department of Reconstruction. The highways will pass through the following routes:—

1. Hangchow-Anhwei Highway: starting from Hangchow, it will pass through Yuhang, Linan, Yichien, and Changhua terminating at Tengchi in Anhwei.

2. Changshan-Yungchia Highway: starting from Changshan, in extreme eastern Chekiang, it will pass through Chuchow, Suichang, Sungyang, and Yensui, terminating at Wenchow.

3. Ningpo-Fukien Highway: starting from Ningpo, it will pass through Fenghua, Ninghai, Linhai, Huang-yen, Loching, Wenchow, Suian and Pingyang, finally entering Fukien.

4. Hangchow-Chinning Highway: starting from Hangchow, it will pass through Hsiaoshan, Hsihsin, Chuchi, Tungyang, Yungkuang, Chenyun and Lisui, thence to branch out into two separate routes one to Kiangsi and the other to Fukien.

Construction of the first two highways has already been started, while that on the other two will be commenced immediately.

MOTOR CARS

ISHIKAWAJIMA JIDOSHA K.K. (Ishikawajima Motor Car Co., Ltd.).—The condition of Ishikawajima Motor Car Co., has improved so rapidly owing to the progress in its technic that it decided to double its capacity for annual output to 800 cars. The company is reported to have already extended a part of their factory.

ANOTHER ALBION FOR HONGKONG.—One of the best known Albion users in Hongkong—The Dairy Farm Ice & Cold Storage Co., Ltd.—have recently given proof of the satisfaction they have obtained from their Albion vehicles by ordering one of the latest 30 cwt. Albion machines, which are, of course, specially designed for Overseas work. The Dairy Farm Company purchased their first Albion in 1914, and this machine is still running to-day, and giving more and more evidence of the economy in purchasing first-class machines. Since 1914, this well-known Company have purchased Albions of various types, and their latest order brings their total fleet to seven.

VULCAN COMMERCIAL VEHICLES.—For many years past Vulcan commercial vehicles from the Lancashire works have been well known in the Overseas markets, and it is not surprising, therefore, to find among recent orders placed with the company several for various parts of the world.

Among these, a particularly interesting order is for a fleet of Vulcan "Prince" 32-seater and "Duke" 20-seater buses for the Hongkong and Shanghai Hotel Co., of China. This is a repeat order following one for a similar fleet which was delivered in 1928, and the Hotel Co. now possesses a fleet of nearly 30 Vulcans.

The British War Office and other Government Departments have been users of Vulcans for a long time, and, recently, a further order was received by the makers for fifteen light six-wheelers.

BUILDINGS

BUILDING ACTIVITY IN SINGAPORE.—Building in Singapore has been extensive during the past few years; the post office, the municipal offices, two Chinese theaters, several quite large apartment houses, and many combination stores and apartment houses, terrace houses, and bungalows have been completed, according to a report from Assistant Trade Commissioner August Brauer, jr., Singapore, Straits Settlements. During 1928, the municipal building surveyor reports that 164 bungalows, 65 terrace houses, and 339 combination stores and apartment houses were completed in Singapore, the number in each case being higher than the total for the previous year. The new combination stores and apartment houses

are being built on the style of some of the smaller apartment houses in America, but have been modified to suit tropical conditions, having circular outside staircases and large porches. At present, many buildings are in the process of construction in Singapore, including an imposing 5-story bank building that is nearing completion, a 5-story building to house the offices and show-rooms of the largest engineering firm in the city, numerous combination stores and apartments, and hundreds of small houses. In addition a large hotel of 850 rooms is being planned.

AVIATION

SWATOW AIRDROME WILL LINK AIRWAYS OF SOUTH CHINA.—A new airdrome is being constructed on the outskirts of Swatow by the Aviation Bureau of the Fukien Provincial Government in an effort to link the airways between Canton and the northern provinces of China.

The new depôt, which is to be equipped with all modern facilities and a latest fuel and refuel system, is expected to be completed early next year.

In order to speed the work, the local fire brigade has been ordered by the local Bureau of Public Safety to assist in pumping out the water from the site.

LARGE HANGAR BUILT AT CHOU-SHUITZU.—A new hanger, 120-ft. by 96-ft., ideally protected from both cold and damp, has been completed at the Choushuitzu (Dairen) Aerodrome of the Japan Air Transport Co. Engineer Kato of the Nakajima Aeroplane Factory, Japan, has been at Dairen to install a

protection of the motor from the cold, in co-operation with the technical staff attached to the Station.

The Fokker Super-Universal, when on flight with a motor of about 300 h.p. generally revolves about 1,550 times per minute. However, whenever the gasifier devised for putting out a mixed gas with air by gassing volatile oil, is affected by ice forming inside it, the revolution will gradually decrease, while increasing the vibration. The motor will then begin "sneezing."

Over the Dairen-Pingyang section, 450 kilometres in flight distance, taking longer than two hours for a trip, both weather and temperature might be expected to change sharply. In intense cold, attended with much humidity, the gasifier might be susceptible to freezing, making further flight impossible. The pilots who had bitter experience in the past from this source, have been advised to study how to improve the British-made motors with which the Fokkers are equipped. As a result, a satisfactory contrivance has been worked out. The passengers' cabins, too, can be kept comfortably warm in any cold weather by means of the new contrivance.

The idea is to seal the windows in the passengers' cabins hermetically and to send in a current of warm air from behind the seats.

More Far Eastern Contracts for Britain

Quite recently several interesting boiler contracts have been obtained by Yarrow & Co., Ltd., Scotstoun, Glasgow. Among them is one for a series of high-pressure land-type boilers for the Imperial Japanese Government, and another for

an installation of three Yarrow boilers, land type for a power station at Bombay. It may be added that the Canadian Pacific liner *Empress of Japan*, which was launched at Fairfield recently, will have high-pressure Yarrow boilers made to special designs prepared by the firm.

Another interesting contract just announced is one placed by the India Stores Department for a broad gauge steam crane for handling coal and wet ashes. It has been obtained by Taylor & Hubbard, Ltd., Leicester. The Department has also awarded the Albion Motor Company a contract for workshop bodies at the price of £12,534.

The contract for the rolling stock required in connection with the electrification of the Madras suburban services of the South Indian Railway has been placed with the English Electric Co., Ltd., whose works are at Rugby, Bradford, Preston, and Stafford. The total value of the contract is approximately £170,000.

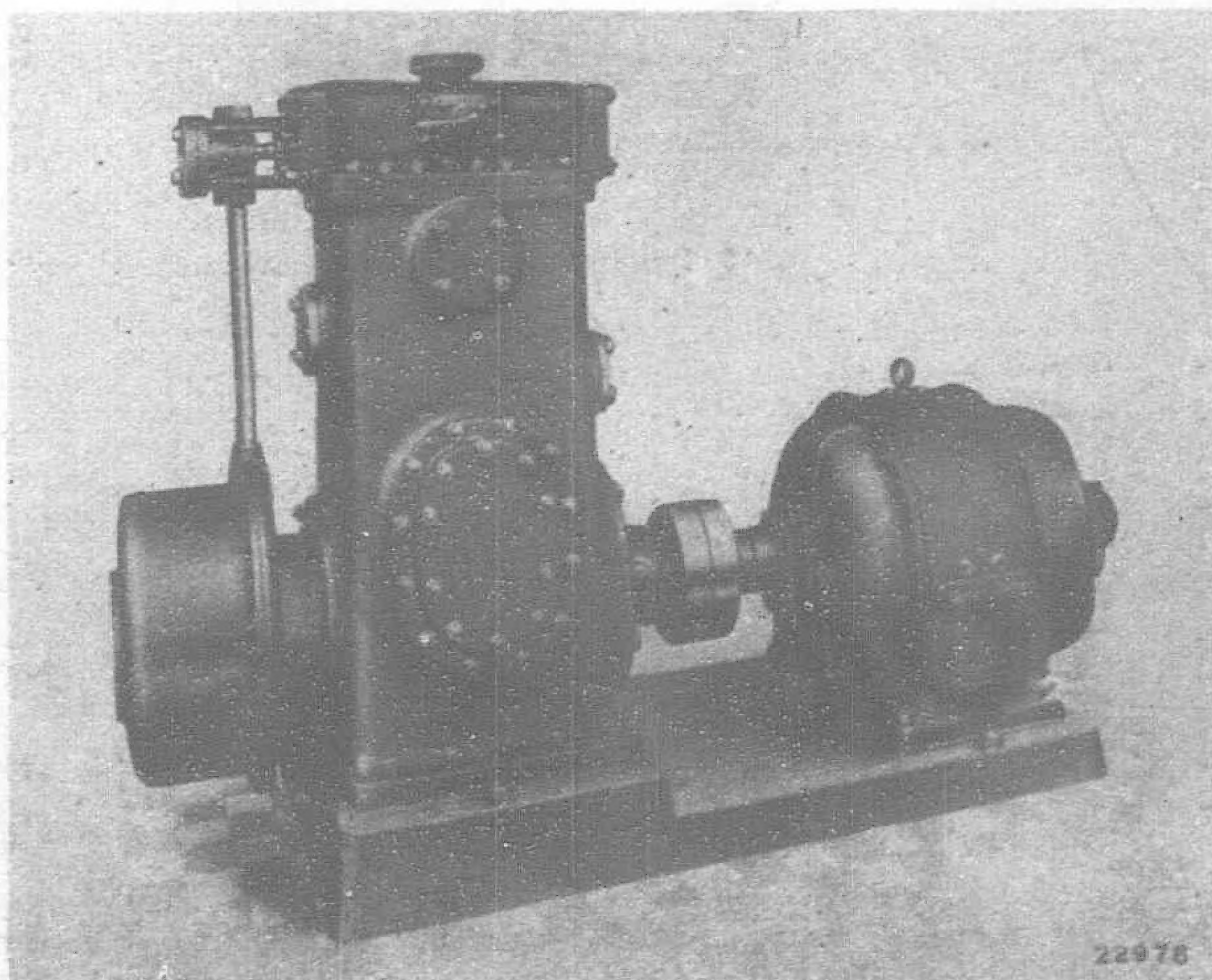
It is stated that tenders which are being asked for the new P. & O. electric liners are calling for ships of 22,100 tons displacement on 29-ft. moulded draft. The speed is to be 20 knots on service, and the length 630 feet, and the breadth 80 feet. A block co-efficient of 0.65 indicates that the new vessels will be very fine lined, and is interesting in view of the fact that the dimensions resemble fairly closely those of the International Mercantile Marine Corporation's *California*, which, however, has a block co-efficient of 0.7. No details are yet available as to the power required to attain a 20-knot speed, nor is there any indication as to who will obtain the contract for the propulsion machinery, although it is currently believed that the British Thomson-Houston Co. will be very seriously considered in this respect. The new P. & O. electric liners may be considered as resembling the *California*, although in some ways they come between the *California* and the new Dollar Line electric liners, which are the largest electric mercantile vessels at present contemplated.

SULZER

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